PROJECT REPORT

METHODOLOGICAL INVESTIGATIONS ON SURVEYS OF IMMUNISATION COVERAGE

for the

MINISTRY OF HEALTH AND FAMILY WELFARE
GOVERNMENT OF INDIA
with assistance from USAID

INSTITUTE FOR RESEARCH IN MEDICAL STATISTICS
(INDIAN COUNCIL OF MEDICAL RESEARCH)
ANSARI NAGAR, NEW DELHI-110 029 INDIA

SEPTEMBER-1991

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DR. PADAM SINGH
DIRECTOR

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CONTENTS

		Page
	PREFACE	I
	EXECUTIVE SUMMARY	(i)
I.	INTRODUCTION	1
II.	MATERIAL AND METHOD	5
III.	IMMUNISATION OF CHILDREN	12
IV.	IMMUNISATION OF MOTHER	41
V.	COMPARISON WITH WHO METHODOLOGY	57
CHARTS		63
ANNEXURES :		
(I)	FIELD AGENCIES	89
(II)	CHILD COVERAGE SCHEDULE	91
(III)	MOTHER COVERAGE SCHEDULE	93

PREFACE

Universal Immunisation Programme launched by the Government of India in 1985 in all the states of the country in a phased manner is a major step towards containing some of the vaccine preventable diseases. Evaluation from time to time is necessary for improving the course of the programme. A number of coverage evaluation studies have been done and the most commonly used methodology is one suggested by World Health Organisation.

This study which was sponsored by Ministry of Health & Family Welfare is an attempt in improving the methodologies currently in use for coverage evaluation. The present study has its significance in view of the precision needed in the estimates of immunisation coverage when the programme is nearing its ultimate targets. A major project covering 175 districts in 4 States of Northern India was completed in a brief period of four months despite the hot weather, rains, social turmoil and general elections. The methodology used has yielded more informative and uniform data which could be utilised in planning other studies of a similar nature.

I am extremely indebted to the Ministry of Health and and Family Welfare, Government of India for identifying this Institute to undertake this study on coverage evaluation of universal immunisation programme through the gracious grant assistance from USAID. I am particularly indebted to Ms. Vineeta Rai, IAS, Joint Secretary and Director, UIP Mission, for her guidance, keen interest and encouragement through-out the course of investigation. I am grateful to Mr. J.P. Mishra, Deputy Secretary and Dr. Devender Verma, Assistant Director of the Ministry of Health & Family Welfare for their keen interest, active participation and their support as members of the Project Committee. They also provided valuable guidance and assistance in the monitoring and implementation of the project which is gratefully acknowledged. Without their help and cooperation, it would have been impossible to complete the task.

I am also thankful to the USAID particularly Mr. J.K. Raman, Programme Officer who ensured the availability of funds in time for the project.

I am grateful to Dr. S.P. Tripathy, Director General, Indian Council of Medical Research for granting permission to undertake the study and for his keen interest and guidance through-out the study. I am also grateful to Dr. (Mrs.) Prema Ramachandran, Deputy Director General (ECD) and Member Project Committee for her expert advice during the course of the investigation.

My thanks are due to Dr. N.P. Gupta, Sr. Consultant for providing guidance and support from the very inception to the completion of the project. Thanks are also due to Dr. H.P. Singh, Consultant for providing the parameters of estimation needed in the study and to Dr. M.P. Dwivedi, Regional Consultant for ensuring the quality of data.

I am also thankful to the Governments of Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh for granting permission to carry out the field work in their states. I also thank the Directors of the Health Services and Chief Medical Officers for extending local assistance as and when required.

I am also thankful to the authorities of the office of the Registrar General of India for providing District Census Reports and other publications needed for the study.

I am also indebted to the field agencies namely Centre for Research, Planning and Action, Techno Economic Research Institute, Centre for Agriculture and Rural Development Studies, New Delhi and Indian Institute of Health Management Research, Jaipur, who have readily accepted the responsibility of carrying out the field work on behalf of the Institute in the four states and delivered the data within the stipulated period despite adverse conditions.

The untiring efforts of the scientific and technical staff of the Institute were an immense source of strength in completing the task. It was assurance from their side which made me confident in accepting the challenge and completing the task in time.

Dr. Darshan Singh, Assistant Director and Head, Field Investigation Division of the Institute shouldered the major responsibility as Programme Coordinator and Drawing and Disbursing Officer of the Project. His contribution with the project is gratefully acknowledged. He was ably assisted by Dr. D.Roy Choudhury, Asstt. Statistician in his work as

Programme Coordinator and by Shri H.D. Joshi, Accounts Officer, Shri A.K. Mittal, Accountant and Mrs. Kusum Luthra, Cashier as Drawing & Disbursing Officer.

The responsibility of checking the data for U.P. was taken care by Dr. Darshan Singh himself and those of Bihar, M.P. & Rajasthan by Dr. R.J. Yadav, Sr. Research Officer, Dr. R.K. Gupta, Sr. Research Officer and Shri C.S. Pande, Technical Officer respectively.

The data processing responsibility of the project was taken care of by Shri I.M.S. Lamba, Assistant Director and Shri Anil Kumar, Data Processing Officer with the able assistance from Shri Rakesh Chand Gupta, Programmer, ICMR, Shri Sharad Kumar Mathur and Shri Rajendra Singh, Statistical Assistants, Shri K.L. Badolia, Field Investigator, Shri Himanshu Kumar and Shri Prahlad Singh, Coding Clerks, which is greatfully acknowledged. The data entry work of the project was attended to by the staff of Division of Data Processing and Monitoring Information.

The work relating to correspondence, secretarial assistance and draft report typing was taken care of by Miss Poonam, Sr. P.A.

The Administration of the Institute provided necessary administrative support to the project. Drivers and Attendants of the Institute had also to work day and night for the project.

The help received from all is gratefully acknowledged.

Padam Singh

(PADAM SINGH)
DIRECTOR

EXECUTIVE SUMMARY

BACKGROUND

In India, morbidity due to vaccine preventable diseases continue to claim heavy toll of infant life and large number of children getting disabled. Even by mid 1980s, infant mortality for the country as a whole, was 97 for every 1000 live births and vaccine preventable diseases were responsible for about one fourth of the total infant deaths. Neo-natal tetanus itself was responsible for 13 out of every 1000 infant deaths i.e. a total of 3,00,000 deaths every year. In the absence of immunisation, 1.5 lakh children were likely to develop paralytic poliomyelitis every year.

Realising the importance of enhancement of child survival and its significance in family planning programme, Government of India, through its National Health Policy, showed its concern in improving the health of women and children over the past two decades. Universal Immunisation Programme is one such endeavour of the Government and this programme has received highest priority. Due to this reason, this programme was declared as one of the Technology Missions and was taken up on a prioriy basis by the Government.

The Universal Immunisation Programme (UIP) was launched in 1985 as part of the overall national strategy to bring down infant and maternal mortality in the country by providing immunisation to all infants against six vaccine preventable diseases and pregnant women against tetanus. Prior to 1985, immunisation activity was implemented under the Family Welfare Programme but the scheme was limited primarily to major hospitals and the coverage levels were also very low.

The objectives of the Universal Immunisation Programme were:-

1 To cover all pregnant women against tetanus and at least 85% of all infants by March 1990, against six vaccine preventable diseases.

2 To increase production, upgrade testing facilities and develop the means, support and distribution of vaccines at the required low temperatures to maintain their potency.

3 To achieve self-sufficiency in vaccine production and manufacture of cold chain equipment. From 1990-91, the target for UIP has been increased to 100%, i.e. to cover all infants.

A number of surveys, small or large, have been undertaken by various agencies for evaluation of this programme. These surveys yielded very valuable information which have been used from time to time for improving the programme. The most commonly used design is the one suggested by WHO popularly known as 30 cluster survey methodology. The study undertaken by IRMS Delhi is one of the attempts in improving the methods currently used. The present study has its significance because of the reliability attached to the estimates at this stage of the programme when it is expected to reach its ultimate target and greater precision is needed in the estimation of coverage levels.

PROPOSED METHODOLOGY

The proposed methodology consists of a stratified two stage design. In each district independent samples are selected from rural and urban areas. In rural areas, the villages are stratified according to their size. Stratum I comprises of villages with population upto 500, Stratum II of villages with population between 500 to 1000, Stratum III between 1000 to 2000 and Stratum IV with more than 2000. From each stratum 5 villages are selected using simple random sampling making total sample size as 20 villages. From each selected village a sample of 15 children between 1 to 2 years of age is taken after allocating it to the two groups, namely SC/ST and others in proportion to their population in the village. In addition, an equivalent sample of mothers of children upto one year of age is also selected from each village. Thus, in rural areas, the total sample consists of 300 children and 300 mothers for assessing their immunisation status and other related aspects.

In urban areas, a sample of 75 children and 75 mothers is taken from two wards of the District Headquarter town and three wards one each from the three other towns selected randomly. The sample of children/mothers is at the rate of 15 per ward.

Thus, the total sample in a district consists of 375 children and 375 mothers.

Information is collected through two structured questionnaires prepared separately for children and mothers containing details on immunisation status, source of immunisation and reasons for non-immunisation. In case of the mother schedule, information on ante-natal care and delivery details is also collected.

The salient findings of the study are as follows:

PRECISION OF THE ESTIMATES

The merit of the proposed methodology is the precision attached with the estimates of immunisation coverage measured in terms of the standard errors (S.E.) at the district level. It has been observed that the average S.E. for the estimates at the district level is 4.85 for U.P., 5.73 for M.P., 5.68 for Rajasthan and 4.55 for Bihar as against 10 percentage points claimed in WHO methodology.

In addition, the proposed methodology provides results within the acceptable margin of error at desired level of disaggregation, viz., SC/ST and others, by size of the villages, rural and urban areas.

IMMUNISATION COVERAGE OF CHILDREN

COVERAGE LEVELS

The estimated coverage levels for DPT/OPV have been observed as 54% for U.P., 63% for M.P., 46% for Rajasthan and 45% for Bihar. The immunisation coverage for BCG has been observed at par with the immunisation of DPT and OPV in the states of U.P., M.P. and Rajasthan but lower for Bihar. For measles, the immunisation coverage levels are lower by 10 to 17 percentage points as compared to DPT and OPV in all the four states.

The dropout rate for DPT/OPV from the first dose to the third dose is of the magnitude of 27% in U.P., 19% for M.P., 22% for Rajasthan and 8% in Bihar. The corresponding dropout rates from second to the third dose of DPT/OPV are observed as 18% for U.P.,

11% for M.P., 12% for Rajasthan and 6% for Bihar. **Thus, the coverage levels can be increased by about 10 percentage points by reducing the dropout from the second dose of OPV/DPT to the third dose. The increase in the coverage level may even be 20 percentage points if dropout from first dose of OPV/DPT to third dose is reduced to a minimum. The main reason observed for the drop out is lack of information. This can be suitably taken care of by enhancing mass media activities and social mobilization measures.**

SEX

Marginal differences have been observed in the coverage levels by sex in all the four states.

SIZE OF THE VILLAGE

The immunisation coverage for children by size of the village indicates that the higher size villages have relatively better coverage levels. This is borne out by the fact that normally Sub-Centres (ANM Head Quarters) are located in large size village and it may be easy to complete the targets from such villages. In this process small size villages, which are at times remote and inaccessible, tend to be neglected.

SOCIAL GROUPS

Significant differences of the magnitude of around 10-20 percentage points are observed in the coverage levels of SC/ST and rest of the population in both rural and urban areas. The differences are of the order of about 20 percentage points in the States of Bihar, 15 percentage points in Rajasthan and about 10 percentage points in the States of U.P. and M.P. The reasons for this, apart from lack of the awareness and neglect by the society, is the fact that they tend to be ignored in the process of completing the targets. **Special efforts therefore should be made to increase the coverage for SC/ST as well as for those residing in small, inaccessible and remote villages. Micro level planning can be of much help in this regard. There is also a need for increasing the awareness and acceptance for this section of population about the benefits of immunisation.**

LITERACY

Both father's and mother's literacy status show significant influence on the immunisation level of the children. The influence is observed more with the literacy status of the mother as compared to that of the father. Even for just literate mothers, immunisation coverage of their children is higher by 10 percentage points as compared to the children of illiterate mothers. The difference in the coverage level between mothers with formal education and mothers without any education is to the tune of 25 percentage points. **Thus, education of mother is the key to the success of the Universal Immunisation Programme and all out efforts need to be made to increase the female literacy in the country. Voluntary organisations may be encouraged to play a more effective role in this direction.**

SOURCE OF IMMUNISATION

In rural areas, almost the entire burden of immunisation is on the Government and the contribution of the voluntary organisations and private agencies is below 5% of the total excepting for Bihar where it is about 13% in the rural areas and 28% in urban areas. No significant differences were observed in the source of immunisation by social groups. However, literate parents tend to utilise the private services in urban areas.

The results amply prove the acceptability of the government as an institution of immunisation and suggest that **the existing health infrastructure should be strengthened for sustaining and enhancing immunisation load in future.**

REASONS FOR NON-IMMUNISATION

Lack of awareness is responsible for non-immunisation in about 50% of the cases. Awareness is multi factorial. Newspapers play hardly any role especially among illiterate rural masses. T.V. and Radio spots are yet to reach the rural masses. **It is suggested that effective community participation in this programme be encouraged through village panchayats.**

There are many obstacles faced by the beneficiaries even if they are aware of the immunisation. In addition there is a need for removing the fear of adverse reaction.

IMMUNISATION COVERAGE OF MOTHERS

COVERAGE LEVELS

The immunisation coverage of pregnant mothers has been estimated at 53% for U.P., 58% for M.P., 41% for Rajasthan and 42% for Bihar. This is comparable with the immunisation coverage levels of DPT and OPV in the case of children. Differences in the coverage levels between strata, social groups and between different levels of literacy are similar to those observed for children.

SOURCE OF IMMUNISATION

The source of immunisation in almost all the cases, is mainly the government and the load shared by voluntary and private organisations is less than 5% in rural areas and around 10% in urban areas. No significant difference is observed in the source of immunisation between social groups. However, rural-urban differences are apparent.

ANTE-NATAL CARE

The proportion of pregnant mothers receiving antenatal care has been estimated as 54% for U.P., 62% for M.P., 48% for Rajasthan and 34% for Bihar. Similarly, the percentage of pregnant mothers taking iron and folic acid tablets have been estimated around 49% for U.P., 59% for M.P., 50% for Rajasthan and 26% for Bihar.

DELIVERY

In about 90% of the cases, in rural areas, the deliveries were performed at home mainly through village dais. However, in urban areas and in stratum 4 villages about 15-30% of the deliveries have been taken care of by health centre staff/trained dais. It is also observed that among those belonging to SC/ST, the proportion of deliveries at home is higher as

compared to the rest of the population. For literate mothers the proportion of deliveries in hospitals are higher as compared to illiterate mothers.

The methodology by Delhi IRMS is based on the assumption that in India, the population of a village is not homogeneous. The Backward and the Scheduled Castes tend to live towards the periphery of the village. It is they, who are likely to have a lower immunisation coverage because of lack of awareness, poverty and also due to neglect by the system. The assumptions have been amply borne out by the data generated through this methodology. The immunisation coverage of the SC/ST is lower and the differences between their coverage levels and that of the rest of the population are of the magnitude of 10-25%. Another assumption made in the methodology is that large size villages are likely to have better immunisation coverages. The data generated through the study supports this assumption. Several other factors have also been taken into consideration in this study.

In WHO methodology villages/wards are selected by assigning higher probability of selection to the large size villages. In addition, the selection of children from the selected villages/wards has some centrist bias. In view of the fact that large size villages have higher coverages and also that those residing in the centre of the village have relatively better coverage, the estimates using WHO methodology generally tend to have upward bias.

Surveys with regard to health sector dealing with immunisation coverage or related aspects should take into consideration these factors in their study to make correct assessments. However, the methodology may be modified taking into account the specific objectives and the local conditions.

Other parts of India need to be studied in a similar manner.

INTRODUCTION

BACKGROUND

Since ages, communicable diseases have been responsible for heavy morbidity and mortality in this country. In pre-independent India, the infant mortality, maternal mortality and the general mortaltiy rates were very high. The situation vastly improved during the post-independent India with the improvement in preventive, promotive, curative and rehabilitative health care system.

Immunisation against many communicable diseases has been known for the last one hundred years since the days of Pasteur. Earlier the vaccines were used for personal protection; it is only in recent years that mass vaccination has been attempted as a measure to change herd structure and eradicate a disease by causing a break in the transmission of the agent.

One of the biggest success stories is that of small pox eradication from the world. The vaccine provided stable immunity for a prolonged period and human cases were the only reservoir of the small pox virus. Oral polio vaccine has eradicated polio from vast parts of the world. Measles, mumps and rubella are now on the list.

It was soon realised that an intervention was required to prevent infections and deaths which mostly occurred during pregnancy, delivery, infancy and childhood. The infant death rate was high in the country. Preventive vaccination could save the infants from deaths due to diphtheria, tetanus, whooping cough and measles. Extensive morbidity, death and disability among survivors caused by poliomyelitis could also be prevented.

The Expanded Programme on Immunisation (EPI) was started in India in 1978 and it was sponsored by the Central Government. The objective was to prevent diseases and deaths

due to six vaccine preventable diseases. Earlier it was a programme under the MCH projects but in 1978, the EPI was separated as an exclusive programme.

Since the progress of EPI was slow, this was upgraded to Universal Immunisation Programme (UIP) in 1985 and became one of the National Technology Missions in the country for better management. The districts covered in this programme in a phased manner by 1989-90 are as under.

DISTRICTS COVERED UNDER UIP

YEAR	NUMBER OF DISTRICTS	CUMULATIVE NUMBER
1985–86	31	31
1986–87	64	95
1987–88	94	189
1988–89	116	305
1989–90	147^{+}	452^{+}

The UIP targets included 85 percent coverage of eligible children and 100 percent of pregnant mothers by 1990. A shift towards infants took place later. It was anticipated that about 22 million children and 25 million mothers would be immunised every year.

Data on Vaccine Preventable Diseases (VPD), is scarce in the country. Data generated through many studies indicated that about 2 million children die or become disabled due to 6 VPD annually. About 500 children are paralysed daily by poliomyelitis, 250,000 die annually of neonatal tetanus, 200,000 die of measles, some 400,000 children die of tuberculosis and 150,000 die of whooping cough. Aftermaths of measles results in severe malnutrition and broncho-pneumonia. Tetanus also takes a heavy toll of life in older children.

The Task Force appointed by the Goverment of India opined that a successful UIP will reduce child morbidity and mortality leading to enhanced survival rate, establish contacts between mother and health care workers, be an entry point for delivery of MCH services and be an important step towards Health for All by 2000 AD.

It was obvious to planners that MCH services including immunisation, care of nutrition and oral hydration for diarrhoeal disease would generally improve the situation for child survival.

The objectives of the UIP are to reduce morbidity and mortality due to Diptheria, Pertussis, Tetanus, Polio, Tuberculosis & Measles among children and due to Tetanus among pregnant women.

EVALUATION OF IMMUNISATION PROGRAMME

Vaccination Coverage Evaluation Surveys of eligible population groups form an important constituent of monitoring and evaluation of the programme implementation. These surveys, if carried out systematically following the techniques suited to the country, yield valuable information on factors responsible for variability in degree of coverage in different parts of the country. India, being a vast country inhabited by population groups having diverse socio-cultural and economic background with varying degree of resource constraints, requires careful planning of such surveys. The usual method employed for rapid assessment of the impact of this programme with respect to its objectives is known as 30 cluster sampling technique recommended by the World Health Organisation(WHO). In this method, selection of 30 villages/towns from a district is made by PPS systematic sampling technique. After selection of the villages/towns, a cluster of 7 children is taken by a random start and this process is repeated for the 30 clusters of the district. The sample consists of 210 children and the results obtained provide estimate only at the district level.

Institute for Research in Medical Statistics (IRMS), New Delhi, has carried out methodological investigations on sample survey methodology for the estimation of immunisation coverage and has suggested an alternative methodology. Through this technique in addition to the estimates at district level, it is possible to have estimates according to population size of the village and socio-economic groups within acceptable margin of error and help in identifying the target areas/groups which require special attention. This methodology consists of a stratified two stage design. In rural areas, the size of the village is used for stratification. Village is taken as primary sampling unit and the child/mother in

the village as the secondary sampling unit. Similarly in urban areas, district Head Quarter town/city is taken as one stratum and other towns/cities together constitute the second stratum. The wards are primary sampling units and child/mother within the ward as secondary sampling unit. The overall sample size consists of 300 children/ mothers from rural areas and 75 from urban areas.

The present investigation, which is sponsored by the Union Ministry of Health and Family Welfare, is to test the operational feasibility and efficacy of the alternative methodology through the data collected from all the districts of Uttar Pradesh, Madhya Pradesh, Rajasthan and Bihar and to provide results on immunisation coverage alongwith their Standard Errors.

MATERIAL AND METHOD

STUDY AREA

The Institute was entrusted with the responsibility of evaluation of Universal Immunisation Programme by the Ministry of Health and Family Welfare in the four states of Uttar Pradesh, Madhya Pradesh, Rajasthan and Bihar. All the districts in the four states were covered as per the details given below:

STATE	NO. OF DISTRICTS
UTTAR PRADESH	63
MADHYA PRADESH	45
RAJASTHAN	28
BIHAR	39
TOTAL	175

REFERENCE PERIOD AND SAMPLED POPULATION

The reference period for the study was one year prior to the date of survey. The sampled population consisted of children and pregnant mothers who were eligible for immunisation one year prior to the date of the survey. Thus, the sampled population for assessing the immunisation status of children comprised of children between 1 to 2 years of age. Similarly the sampled population for assessing the immunisation status of pregnant mothers comprised of mothers of children upto 1 year of age. The field work for this study was carried out during April-August, 1991.

SAMPLING METHODOLOGY

The methodology used in rural and urban areas is as follows:

RURAL AREA

In the design of the study, the stratification was according to the population size. The village was primary sampling unit and child/mother as the secondary sampling unit. Its details are as under.

Stratification : All villages of the district were classified into following four strata according to the village population.

Stratum I	Small Villages	- Villages with population less than 500
Stratum 2	Moderately small Villages	- Villages with population between 500 and 1000
Stratum 3	Medium size Villages	- Villages with population between 1000 and 2000
Stratum 4	Large size Villages	- Villages with population more than 2000

For the purpose of this stratification, 1981 Census population figures were used. In these 4 strata, the expected average population size was around 300, 750, 1500 and 3000 respectively. Further this stratification resulted in dividing the district into top 10%, next 15 %, 25 % and bottom 50 % of the villages. This stratificaion was expected to provide better results as within strata variability was less.

Selection of Villages: From each stratum, five villages were selected by simple random sampling technique. Thus, the total number of villages selected were 20.

The villages thus selected were identified on the district map with the help of their identification number. The district map was generally attached with the Primary Census Abstract of the district. This was helpful in chalking out the travel routes optimally. In this connection, the District Health Authorities, were also consulted as they were conversant with the accessibility of the selected villages and from the point of view of logistics.

Selection of children from each village: From each selected village, 15 children of ages 12 to 24 months were selected following the procedure given below.

In the selected village, different clusters of settlements/bastis resided by different communities like Harijans, Kumhars, etc. were identified and the population size, location and other relevant information relating to these bastis available with Health worker/Anganwadi

worker/Patwari/ Chowkidar/other knowledgeable individuals in the village was collected. After identifying these bastis, a list of two types of bastis separately for SC/ST communities and those resided by other communities alongwith their population size was prepared. The number of children covered from these two sets of bastis, that is, SC/ST and others was allocated in proportion to their population size. Number of bastis to be surveyed were selected at the rate of about 4 children per basti. This provided self weighting at village level. After the bastis to be surveyed were selected, the investigator went to the centre of the basti and identified different directions in which houses were located. He then selected one of the directions randomly. He approached the first house on his left and enquired if there was a child of desired age group. In case there was no such child, he was expected to proceed to the immediate next house for enquiring about the child. He continued this process till he found a household with the child and collected the desired information. This process was continued till he got the desired number of children. In case, the desired number of children could not be covered from that basti, efforts were made to cover the remaining children from the adjoining basti of the same socio-economic group.

If updated birth and death register or household survey register were available in the village, the same were also utilised for the selection of children.

In case of small size villages, sometimes it was not possible to get all the 15 children from that village. This was compensated by covering more chidren from large size villages.

Selection of mothers from each village: The selection of mothers was desired for children who were less than one year of age at the time of survey. For this, all mothers in the households of the children selected for immunization coverage were taken. If no mother of the child of desired age in the household was available, mother from the neighbouring household was taken and the process was continued till the mother having a child of the desired age group was identified. This process was continued till the desired number of mothers were covered.

URBAN AREA

In case of urban areas of the district (that is, towns and cities with population more than 5,000 and having characteristics of the urban area), it was proposed to cover 75 children

between 12 months to 24 months of age and 75 mothers having children upto 1 year of age. Out of these, two-fifth was surveyed from the District Head Quarter and one-fifth each from three towns selected randomly from the urban areas of the District. The number of children/mothers covered were fixed at 75 keeping in view of the rural-urban ratio of 80 : 20.

Since the urban areas were divided into wards and sub-wards, two wards from the District Head Quarters and one each from the selected three towns were selected randomly. The selection procedure for the children and mothers from the wards and their allocation was similar to one adopted for the villages in the rural areas. The desired information on each selected child and mother was collected with the help of a schedule prepared for this purpose by interviewing the mother of the child or the adult member present in the household at the time of survey.

OPERATIONAL DETAILS

Field work of the study was given to the reputed institutions/research centres having experience of similar survey work (Annexure - I). The supervision was taken care of by the staff of IRMS and Consultants appointed for this purpose. Field staff was given thorough training at IRMS for maintaining uniformity of the concepts and reliability of information collected. The IRMS contacted the State Governments and obtained permission for carrying the field work in their states. The Institute for Research in Medical Statistics(ICMR), New Delhi, demonstrated the methodology of data collection in one district of each of the four states. The IRMS also took the responsibility of monitoring of data collection, its analysis and report writing. Data were collected through precoded structured questionnaires. The data were transferred on floppies. A software was developed for the analysis of the data.

A project committee having representatives from Ministry of Health and Family Welfare and Indian Counil of Medical Research was constituted to advise the Project Director on project activities.

ESTIMATION PROCEDURE

The estimation procedure used for computation of estimates at stratum level and district level together with their variances and Standard Errors (S.E.) was as follows:

NOTATIONS

Suffix

h denotes Stratum
i denotes Village/Ward
j denotes Child/Mother

h takes values 1 to 4 for 4 strata of rural areas and value 5 for urban areas.

Superscripts used are

S for SC/ST
N for others i.e. non SC/ST

y = Character under study i.e. immunisation status of child/mother which takes value 1 if immunised and 0 otherwise

y_{hij} = Value of the character under study for j_{th} child/mother of ith village/ward of h_{th} stratum.

p^{S}_{hi} = Estimated proportion of SC/ST children/mother immunised in the i_{th} village/ward of h_{th} stratum.

p^{N}_{hi} = Estimated proportion of non SC/ST children/mother immunised in the i_{th} village/ward of h_{th} stratum.

p_{hi} = Estimated proportion of all children/mother immunised in the i_{th} village/ward of h_{th} stratum.

n^{S}_{hi} = Number of SC/ST children/mothers in the sample from i-th village/ward of h-th stratum.

n^{N}_{hi} Number of non SC/ST children/mothers in the sample from i-th village/ward of h-th stratum.

Obviously

$$p_{hi} = W^{S}_{hi}\, p^{S}_{hi} + W^{N}_{hi}\, p^{N}_{h.}$$

Where

W^{S}_{hi} = Proportion of SC/ST children in the population of i_{th} village/ward of h_{th} stratum.

W^{N}_{hi} = Proportion of non SC/ST children in the population of i_{th} village/ward of h_{th} stratum.

$p_h = 1/5 \sum_{i=1}^{5} p_{hi}$ = Estimated proportion of children immunised for h_{th} stratum.

Estimate of variance of p_{hi} is given by

$$V(p_{hi}) = \left[(W^s_{hi})^2 \frac{p^s_{hi} q^s_{hi}}{n^s_{hi}} + (W^N_{hi})^2 \frac{p^N_{hi} q^N_{hi}}{n^N_{hi}} \right]$$

The variance estimator of p_h is given by

$$V(p_h) = 1/5 \left[S_{bh}^2 + \bar{S}_{wh}^2 \right], \text{ Where}$$

$$\bar{S}_{wh}^2 = 1/5 \sum_{i=1}^{5} V(p_{hi})$$

$$\bar{S}_h^2 = 1/4 \sum_{i=1}^{5} (p_{hi} - p_h)^2$$

The estimator for the district is given by

$$p = \sum_{h=1}^{5} W_h p_h ,$$

Where W_h is the weight for h_{th} stratum i.e. children in the h_{th} stratum as proportion to the total number of children in the district.

Variance of p is given by

$$V(p) = \sum W_h^2 \, v(p_h)$$

$$SE(p) = \sqrt{V(p)}$$

In the proposed methodology, it is possible to estimate the proportion of children immunised separately for SC/ST and others. The estimator for SC/ST for h_{th} stratum is given by

$$p^s_h = 1/5 \sum_{i=1}^{5} p^s_{hi}$$

The variance estimator of P^S_h is given by

$$V(p^s_h) = \frac{(S^s_{bh})^2 + (\bar{S}^s_{wh})^2}{5} , \quad \text{Where}$$

$$(S^s_{wh})^2 = 1/5 \sum^{5} V\ (p^s_{hi})$$

$$= 1/5 \sum_{i=1}^{5} \frac{p^s_{hi}\ q^s_{hi}}{n^s_{hi}}$$

$$(S^s_{bh})2 = 1/4 \sum_{i=1}^{5} (p^s_{hi} - p^s_h)^2$$

On the same lines, the estimator for non SC/ST and rural, urban areas was also worked out.

Within the district, the ratio of children and total population has been assumed same in all strata for the purpose of computing weights.

IMMUNISATION OF CHILDREN

This Chapter presents the results on the estimated immunisation coverage of children. The results are presented separately by sex, caste and literacy of the mother and that of the father. These results are based on parameter of the sampling design used in the study.

It may be mentioned that this study is aimed at evolving an appropriate methodology for estimation of proportion of children immunised at district level taking into account the field conditions prevalent in the country. The merit of the study is the analysis of variability and the estimates of Standard Error, reflecting the precision attatched to the estimates of immunisation coverage. The estimates of level of immunisation coverage for all the districts of the four states are the byproduct of the study.

STATE LEVEL

Utilising the estimation procedure consistent with the sampling design used, Table 3.1 presents the estimated immunisation coverage for the four States.

TABLE 3.1 - IMMUNISATION COVERAGE OF CHILDREN (%)

STATE	UP	MP	RAJASTHAN	BIHAR
DPT	54	63	46	45
OPV	54	63	46	45
MEASLES	43	52	36	28
B.C.G	55	60	44	32

The percentage of children receiving three doses of DPT and OPV has been estimated as 54 for U.P., 63 for M.P., 46 for Rajasthan and 45 for Bihar. The estimated coverage level for BCG is 55 for U.P., 60 for M.P., 44 for Rajasthan and 32 percent for Bihar. Thus, the

BCG coverage has been of the same order as DPT/OPV in U.P., M.P. and Rajasthan but lower for Bihar. The level of coverage for measles has been found to be 43 for U.P., 52 for M.P., 36 for Rajasthan and 28 percent for Bihar indicating that the coverage for measles has been much lower as compared to other vaccines in all the four states.

PARTIAL COVERAGE

It is important to study the extent of complete and partial coverage for DPT and OPV. With this in view, results have been obtained for each dose of DPT/OPV and presented in Table 3.2.

TABLE 3.2 - IMMUNISATION COVERAGE OF CHILDREN FOR THREE DOSES OF DPT/OPV (%)

DPT/OPV	UP	MP	RAJASTHAN	BIHAR
1st dose	74	78	59	49
2nd dose	66	71	52	46
3rd dose	54	63	46	45

TABLE 3.2 (a) CONTINUATION RATE FROM 1ST DOSE TO 2ND, 2ND TO 3RD AND 1ST TO 3RD DOSE (%)

2 v/s 1	89	91	88	94
3 v/s 2	82	89	88	94
3 v/s 1	73	81	78	92

The continuation rate {Table 3.2 (a)} for second dose of OPV/DPT was 89% for U.P., 91% for M.P., 88% for Rajasthan and 94% for Bihar. For third dose the continuation rate was 82% for U.P. and 88 to 94% for other states. The completion rate measured in terms of number of children receiving all doses to those receiving only the first dose was 73% for U.P., 81% for M.P., 78% for Rajasthan and 92% for Bihar. In other words, the dropout rate from DPT/OPV (1st dose) to DPT/OPV (3rd dose) was 27% for U.P., 19% for M.P., 22% for Rajasthan and 8% for Bihar.

DISTRICT LEVEL

Table 3.4 (a) presents the results at district level for the four states.

TABLE 3.4 (a) DISTRICT WISE IMMUNISATION COVERAGE OF CHILDREN (%)

U.P.

NAME OF DISTT.	DPT	OPV	MEASLES	BCG
AGRA	48	48	44	58
FEROZABAD	44	45	39	47
ALIGARH	42	42	34	51
ETAH	52	52	47	57
MAINPURI	46	46	38	51
MATHURA	45	45	41	55
ALLAHABAD	44	43	38	45
FATEHPUR	56	56	52	62
PRATAP GARH	68	68	58	69
BAREILLY	66	65	50	62
PILIBHIT	55	55	48	58
SHAHJAHANPUR	59	59	46	65
FAIZABAD	68	67	65	67
BARABANKI	55	55	44	57
BAHRAICH	44	44	31	47
GONDA	44	44	32	47
SULTANPUR	57	57	44	58
AZAMGARH	67	67	56	67
MAU	37	37	22	29
GORAKHPUR	58	58	37	44
MAHRAJGANJ	52	53	34	41
DEORIA	46	46	28	37
BASTI	53	53	32	49
SIDDHARATH NAGAR	55	55	34	50
BUDAUN	45	45	31	44
PAURI GARHWAL	84	84	72	78
TEHRI GARHWAL	63	65	58	61
DEHRADUN	81	81	72	81
UTTARKASHI	58	57	53	68

NAME OF DISTT.	DPT	OPV	MEASLES	BCG
CHAMOLI	73	73	56	74
JHANSI	37	39	34	41
LALITPUR	54	54	50	58
JALAUN	30	30	27	33
HAMIRPUR	39	39	33	41
BANDA	41	41	36	49
ALMORA	91	91	84	93
NAINITAL	74	74	63	76
PITHORAGARH	74	74	57	77
KANPUR (RURAL)	62	62	47	62
KANPUR (CITY)	67	67	58	70
ETAWAH	41	40	35	45
FARRUKHABAD	35	35	33	41
LUCKNOW	43	42	34	52
KHERI	61	61	55	60
SITAPUR	52	51	43	48
HARDOI	34	35	25	41
RAE BARELI	69	69	56	66
UNNAO	46	46	31	48
BULANDSHAHR	68	67	50	67
GHAZIABAD	44	43	28	47
MEERUT	64	64	60	69
MAJAFFAR NAGAR	50	48	35	46
SAHARANPUR	58	56	48	64
HARIDWAR	48	48	38	50
BIJNOR	70	70	55	65
MORADABAD	61	61	57	59
RAMPUR	63	63	63	71
BALLIA	63	63	43	60
GHAZIPUR	61	61	38	58
JAUNPUR	57	57	36	50
MIRZAPUR	49	49	31	40
SONBHADRA	42	42	30	44
VARANASI	61	61	53	65
AVERAGE	54	54	43	55

M. P.

NAME OF DISTT.	DPT	OPV	MEASLES	BCG
BALAGHAT	72	71	61	72
BASTAR	48	48	48	48
BETUL	73	70	62	72
BHIND	68	69	52	54
BHOPAL	68	67	58	67
BILASPUR	72	72	68	73
CHHATARPUR	59	60	58	58
CHHINDWARA	71	70	63	71
DAMOH	60	55	52	77
DATIA	41	41	32	40
DEWAS	56	57	40	43
DHAR	68	69	38	45
DURG	76	71	69	75
EAST NIMAR	71	72	19	29
GUNA	57	57	51	55
GWALIOR	62	62	50	55
HOSHANGABAD	68	68	67	71
INDORE	58	59	28	34
JABALPUR	62	63	42	67
JHABUA	65	65	58	65
MANDLA	75	75	74	78
MANDSAUR	78	78	63	64
MORENA	46	46	40	46
NARSIMHAPUR	70	70	64	74
PANNA	52	53	47	57
RAIGARH	78	78	76	76
RAIPUR	70	70	58	65
RAISEN	57	59	38	55
RAJGARH	70	72	62	72
RAJNANDGAON	73	72	65	73
RATLAM	73	73	60	63
REWA	40	38	24	44
SAGAR	77	76	65	82
SATNA	51	49	40	44
SEHORE	49	63	37	42
SEONI	67	65	57	70
SHAHDOL	67	66	57	70

NAME OF DISTT.	DPT	OPV	MEASLES	BCG
SHAJAPUR	55	59	49	52
SHIVPURI	66	66	25	28
SIDHI	31	29	26	30
SURGUJA	71	71	70	76
TIKAMGARH	36	36	30	45
UJJAIN	68	70	51	71
VIDISHA	62	61	55	60
WEST NIMAR	80	78	70	75
AVERAGE	63	63	52	60
AVERAGE*	63	63	54	62

RAJASTHAN

NAME OF DISTT.	DPT	OPV	MEASLES	BCG
AJMER	56	54	28	54
ALWAR	57	57	37	47
BANSWARA	52	53	43	53
BARMER	22	22	16	27
BHARATPUR	37	37	28	36
BHILWARA	48	48	47	45
BIKANER	50	48	45	52
BUNDI	67	67	63	75
CHITTOR GARH	53	54	44	43
CHURU	27	27	14	29
DHOLPUR	46	46	32	46
DUNGARPUR	64	64	60	63
GANGANAGAR	46	45	26	35
JAIPUR	48	48	36	42
JAISALMER	36	37	30	36
JALOR	32	32	20	35
JHALAWAR	77	77	64	77
JHUNJHUNUN	43	43	39	41
JODHPUR	27	27	21	23
KOTA	51	53	47	55
NAGAUR	42	43	36	41
PALI	46	45	29	35
SWAI MADHOPUR	32	32	19	22
SIKAR	45	45	33	39
SIROHI	53	56	45	58
TONK	50	50	47	53
UDAIPUR	64	64	51	58
DAUSA	28	26	13	19
AVERAGE	46	46	36	44
AVERAGE*	48	48	38	47

NAME OF DISTT.	DPT	OPV	MEASLES	BCG
AURANGABAD	69	70	54	54
BEGUSARAI	43	43	24	27
BHAGALPUR	37	38	22	26
BHOJPUR	51	50	35	34
DARBHANGA	16	22	13	13
DEOGHAR	44	45	46	45
DHANBAD	54	54	23	27
GAYA	46	47	22	26
GIRIDIH	45	45	13	15
GODDA	62	62	38	49
GOPALGANJ	45	46	37	32
GUMLA	45	45	35	46
HAZARI BAGH	47	48	34	34
JAHANABAD	55	55	35	34
KATIHAR	54	55	27	53
KHAGARIA	53	53	25	24
LOHARDAGGA	48	48	24	28
MADHEPURA	60	60	60	62
MADHUBANI	43	39	14	16
MUNGER	28	29	13	17
MUZAFFARPUR	45	45	25	29
NALANDA	31	32	9	11
NAWADA	46	46	11	26
PALAMU	51	51	50	53
CHAMPARAN (W)	42	42	25	38
PATNA	46	48	35	38
SITAMARHI	37	37	23	24
CHAMPARAN (E)	33	36	30	30
SIWAN	42	43	22	19
PURNIA	49	49	46	44
RANCHI	43	43	22	23
ROHTAS	64	64	31	60
SAHARSA	22	22	15	15
DUMKA	29	29	19	23
SAHEBGANJ	50	49	44	46
SAMASTIPUR	79	70	50	51
SARAN	35	38	21	25
SINGHBHUM	37	38	27	30
VAISHALI	29	32	17	15
AVERAGE	45	45	28	32
AVERAGE*	44	45	32	36

*Excluding those districts in which the differences in the coverage for DPT/OPV and BCG is 15 percentage points or more.

In some of the districts especially in Bihar and to some extent in M.P. and Rajasthan the immunisation coverage of BCG and Measles was found to be lower by more than 15 percentage points.

In this connection it may be mentioned here, that 90% of the deliveries took place at home and there was no system of immediate registration of births in the rural areas. By the time basic health worker came to know of the new birth, the infant, in many cases, was ready to receive first dose of DPT and Polio. In this process BCG vaccination was missed. In some areas BCG vaccination continued to be a part of Tuberculosis Control Programme and was integrated with UIP only recently. All these factors might be responsible for lower coverage of BCG in these areas. The low coverage seen in measles immunisation could be because it was late entrant in this programme, also was an isolated immunisation and received limited attention by the rural population.

The average coverage based on the data of the districts not showing these differences were worked out for each state and is shown in the bottom line of the state table.

Following table - 3.4 (b) summarises the results of immunisation coverage of children excluding districts with lower BCG coverage as compared to DPT/OPV by 15 percentage point or more.

TABLE 3.4 (b) IMMUNISATION COVERAGE OF CHILDREN (%) EXCLUDING DISTRICTS WITH BCG COVERAGE LOWER BY 15% OR MORE AS COMPARED TO DPT/OPV

STATE	U.P.	M.P.	RAJASTHAN	BIHAR
DPT	55	63	48	44
OPV	55	63	48	45
MEASLES	45	54	38	32
BCG	56	62	47	36

With this analysis, at the aggregate level, no appreciable change has been observed for DPT and OPV. However, this analysis showed improvement with regard to BCG and Measles coverage to the extent of upto 3 percentage points.

Table 3.5 summarises the estimated coverage levels at district level in the form of a frequency distribution. It would appear from the table that for DPT the percentage of the districts having 75% or higher coverage was almost negligible for Bihar and Rajasthan. In these two states, the proportion of districts having less than 33 percent coverage were sizable.

The number of districts having coverage level between 40-60% were 54% in U.P., 31% in M.P., 57% in Rajasthan and 59% in Bihar.

In case of measles a significant proportion of districts had 33% or less coverge, being 22% for U.P., 16% for M.P., 46% for Rajasthan and 59% for Bihar.

TABLE 3.5 – DISTRIBUTION OF DISTRICTS BY PERCENTAGE IMMUNISATION OF CHILDREN

UP

PERCENTAGE	≤ 33	33 -40	40-50	50-60	60-75	> 75
DPT	1	5	19	15	20	3
OPV	1	5	19	15	20	3
MEASLES	14	14	14	15	5	1
B.C.G	2	2	23	22	18	5

MP

PERCENTAGE	≤ 33	33 -40	40-50	50-60	60-75	> 75
DPT	1	2	4	10	23	5
OPV	1	2	4	8	26	4
MEASLES	7	6	5	12	14	1
B.C.G	3	2	9	9	18	4

RAJASTHAN

PERCENTAGE	≤ 33	33 -40	40-50	50-60	60-75	> 75
DPT	6	2	10	6	3	1
OPV	6	2	10	6	3	1
MEASLES	13	4	7	2	2	0
B.C.G	5	6	7	7	1	1

BIHAR

PERCENTAGE	≤ 33	33 -40	40-50	50-60	60-75	> 75
DPT	7	4	17	6	4	1
OPV	6	6	15	8	3	1
MEASLES	23	6	6	3	2	0
B.C.G	25	2	8	2	1	0

STANDARD ERROR OF THE ESTIMATES

Table 3.6 (a) presents district wise Standard Error (SE) of the estimates of immunisation coverage for DPT for all the four states. The standard error for OPV would be of the same magnitude as that for DPT and those for BCG and Measles were expected somewhat lower because of lower variability and therefore not included in this analysis.

TABLE 3.6(a) STANDARD ERROR (SE) OF THE ESTIMATED COVERAGE LEVEL

U.P.

NAME OF DISTT.	S. E.	NAME OF DISTT.	S. E.
AGRA	6.58	KANPUR (RURAL)	6.05
ALIGARH	4.61	KANPUR (URBAN)	4.37
ALLAHABAD	6.45	KHERI	5.02
ALMORA	2.20	LALITPUR	4.29
AZAMGARH	4.09	LUCKNOW	5.06
BAHRAICH	5.38	MAINPURI	3.58
BALLIA	3.15	MATHURA	5.27
BANDA	4.19	MEERUT	4.73
BARABANKI	3.50	MIRZAPUR	5.15
BAREILLY	6.04	MORADABAD	5.94
BASTI	4.79	MUJAFFAR NAGAR	4.68
BIJNOR	5.82	NAINITAL	4.56
BUDAUN	4.05	PILIBHIT	5.41
BULANDSHAHR	5.69	PITHORAGARH	4.90
CHAMOLI	2.94	PRATAP GARH	5.38
DEHRADUN	4.44	RAE BARELLY	6.66
DEORIA	5.35	RAMPUR	4.75
ETAH	5.99	SAHARANPUR	6.94
ETAWAH	4.40	SHAHJAHANPUR	4.26
FAIZABAD	5.48	SITAPUR	6.31
FARRUKHABAD	5.42	SULTANPUR	5.20
FATEHPUR	4.81	TEHRI GARHWAL	3.94
PAURI GARHWAL	2.43	UNNAO	5.99
GHAZIABAD	4.31	UTTARKASHI	4.12
GHAZIPUR	5.03	VARANASI	5.76
GONDA	5.81	MAHARAJGANJ	4.39
GORAKHPUR	4.73	FEROZABAD	5.16
HAMIRPUR	4.82	SIDDARTHNAGAR	4.55
HARDOI	6.05	MAU	3.10
JULAUN	4.09	HARIDWAR	5.48
JAUNPUR	4.35	SONBHADRA	4.57
JHANSI	4.17		
			4.85

M.P.

NAME OF DISTT.	S. E.	NAME OF DISTT.	S. E.
BALAGHAT	5.56	NARSIMHAPUR	5.22
BASTAR	5.78	PANNA	6.43
BETUL	5.04	RAIGARH	7.65
BHIND	5.21	RAIPUR	6.29
BHOPAL	5.10	RAISEN	7.91
BILASPUR	4.62	RAJGARH	4.67
CHHATARPUR	5.15	RAJNANDGAON	2.93
CHHINDWARA	6.62	RATLAM	5.51
DAMOH	6.42	REWA	8.16
DATIA	7.01	SAGAR	4.07
DEWAS	6.67	SATNA	6.08
DHAR	7.25	SEHORE	5.93
DURG	2.70	SEONI	4.72
EAST NIMAR	4.43	SHAHDOL	6.24
GUNA	6.06	SHAJAPUR	8.01
GWALIOR	4.86	SHIVPURI	8.65
HOSHANGABAD	6.87	SIDHI	6.27
INDORE	4.79	SURGUJA	5.58
JABALPUR	5.54	TIKAMGARH	6.33
JHABUA	6.29	UJJAIN	5.53
MANDLA	6.81	VIDISHA	2.57
MANDSAUR	3.67	WEST NIMAR	5.70
MORENA	4.83		
			5.73

RAJASTHAN

NAME OF DISTT.	S. E.	NAME OF DISTT.	S. E.
AJMER	5.89	JAISELMER	6.05
ALWAR	4.65	JALOR	6.41
BANSWARA	6.25	JHALAWAR	4.22
BARMER	5.45	JHUNJHUNUN	6.19
BHARATPUR	5.68	JODHPUR	4.87
BILWARA	4.58	KOTA	5.06
BIKANER	6.25	NAGAUR	5.80
BUNDI	6.66	PALI	5.13
CHITTOR GARH	5.62	SWAI MADHOPUR	6.39
CHURU	7.64	SIKAR	4.31
DHOLPUR	6.10	SIROHI	9.37
DUNGARPUR	5.99	TONK	4.84
GANGANAGAR	4.31	UDAIPUR	5.33
JAIPUR	5.62	DAUSA	4.38
			5.68

BIHAR

NAME OF DISTT.	S. E.	NAME OF DISTT.	S. E.
AURANGABAD	4.20	MUZAFFARPUR	7.01
BEGUSARAI	6.49	NALANDA	3.57
BHAGALPUR	4.42	NAWADA	4.51
BHOJPUR	3.70	PALAMU	4.55
DARBHANGA	2.55	CHAMPARAN (W)	3.23
DEOGHAR	5.54	PATNA	5.76
DHANBAD	5.22	SITAMARHI	3.63
GAYA	3.81	CHAMPARAN (E)	5.93
GIRIDIH	5.26	SIWAN	4.83
GODDA	5.63	PURNIA	3.07
GOPALGANJ	4.78	RANCHI	2.89
GUMLA	5.41	ROHTAS	5.22
HAZARI BAGH	3.22	SAHARSA	4.78
JAHANABAD	4.92	DUMKA	4.37
KATIHAR	4.75	SAHEBGANJ	4.83
KHAGARIA	4.56	SAMASTIPUR	3.87
LOHARDAGGA	2.90	SARAN	5.49
MADHEPURA	4.39	SINGHBHUM	4.94
MADHUBANI	5.83	VAISHALI	4.71
MUNGER	2.54		
			4.55

It will be seen that on the average the SE associated with the estimator at district level was 4.85 for U.P., 5.73 for M.P., 5.68 for Rajasthan and 4.55 for Bihar.

COMPARING THE EVALUATED COVERAGE WITH REPORTED FIGURES

Table 3.6(b) provides comparison of estimated coverage levels and the reported one's supplied by the Union Ministry of Health & Family Welfare. The upper value of the 95 percent confidence interval computed as estimated value and standard error is also shown in this table. It may be mentioned that the reference period for immunisation coverage through the evaluation survey is April-August 1989 to April-August, 1990 whereas that for the routine reporting for the programme corresponds to April 1990 to March, 1991. For

making a comparison, therefore, adjustment has to be made in the reported coverage levels for 1990-91. It has been estimated that this adjustment would amount to lowering of the reported coverage figures by about 10%.

Further, in the coverage evaluation surveys the figures of eligible children as well as those immunised are for the same cohort, but under the usual reporting system the figures of targets and achievements are worked out independently. In fixing the targets child population in the required age group of one year is estimated on the assumptions of growth rate as well as Infant Mortality Rate based on the results at the State level and assumed same for all the districts of the State. The reported figures of achievements include the following:

(a) Immunisation done for the eligible children of one year of age.

(b) Immunisation done for the children over one year of age.

(c) Immunisation done for the children who were born during the year i.e. below one year of age.

It may be mentioned that (b) and (c) are not the part of the child population considered in fixing the target and thus over estimates the achievements. This would make the difference of another 10-20 percentage points as per the impressions of the programme officers.

Thus, while making the comparisons, one should allow for a difference of about 25 percentage points.

TABLE 3.6 (b) - COMPARISON OF IMMUNISATION COVERAGE AT THE DISTRICT LEVEL FOR DPT

U.P.

NAME OF DISTT.	ESTIMATED	UPPER VALUE OF 95 % CONFIDENCE INTERVAL	REPORTED
AGRA	48	60	106
FEROZABAD	44	54	108
ALIGARH	42	51	98
ETAH	52	64	101
MAINPURI	46	53	113
MATHURA	45	56	113
ALLAHABAD	44	57	106
FATEHPUR	56	66	104
PRATAP GARH	68	79	113
BAREILLY	66	78	98
PILIBHIT	55	66	99
SHAHJAHANPUR	59	68	113
FAIZABAD	68	79	92
BARABANKI	55	62	114
BAHRAICH	44	55	108
GONDA	44	56	93
SULTANPUR	57	67	94
AZAMGARH	67	75	89
MAU	37	43	112
GORAKHPUR	58	67	111
MAHRAJGANJ	52	61	114
DEORIA	46	57	95
BASTI	53	63	101
SIDDHARATH NAGAR	55	64	91
BUDAUN	45	53	78
PAURI GARHWAL	84	89	88
TEHRI GARHWAL	63	71	100
DEHRADUN	81	90	104
UTTARKASHI	58	66	127
CHAMOLI	73	79	96
JHANSI	37	45	97
LALITPUR	54	63	105
JALAUN	30	38	106
HAMIRPUR	39	49	97
BANDA	41	49	92
ALMORA	91	95	65
NAINITAL	74	83	59
PITHORAGARH	74	84	101
KANPUR (RURAL)	62	74	100
KANPUR (CITY)	67	76	88
ETAWAH	41	46	108

NAME OF DISTT.	ESTIMATED	UPPER VALUE OF 95 % CONFIDENCE INTERVAL	REPORTED
FARRUKHABAD	35	46	102
LUCKNOW	43	53	102
KHERI	61	71	106
SITAPUR	52	65	106
HARDOI	34	46	107
RAE BARELI	69	82	103
UNNAO	46	58	126
BULANDSHAHR	68	79	102
GHAZIABAD	44	53	120
MEERUT	64	73	99
MUJAFFAR NAGAR	50	59	83
SAHARANPUR	58	72	83
HARIDWAR	48	59	101
BIJNOR	70	82	111
MORADABAD	61	73	97
RAMPUR	63	73	112
BALLIA	63	69	100
GHAZIPUR	61	71	118
JAUNPUR	57	66	99
MIRZAPUR	49	59	87
SONBHADRA	42	51	86
VARANASI	61	73	101

M.P.

NAME OF DISTT.	ESTIMATED	UPPER VALUE OF 95 % CONFIDENCE INTERVAL	REPORTED
BALAGHAT	72	83	85
BASTAR	48	60	102
BETUL	73	83	95
BHIND	68	78	93
BHOPAL	68	78	92
BILASPUR	72	81	101
CHHATARPUR	59	69	72
CHHINDWARA	71	84	111
DAMOH	60	73	86
DATIA	41	55	92
DEWAS	56	69	90
DHAR	68	83	84
DURG	76	81	93
EAST NIMAR	71	80	103
GUNA	57	69	89
GWALIOR	62	72	105
HOSHANGABAD	68	82	86
INDORE	58	68	121
JABALPUR	62	73	109
JHABUA	57	70	89
MANDLA	75	89	110
MANDSAUR	78	85	98
MORENA	46	56	78
NARSIMHAPUR	70	80	93
PANNA	52	65	62
RAIGARH	78	93	66
RAIPUR	70	83	111
RAISEN	57	73	93
RAJGARH	70	79	100
RAJNANDGAON	73	79	114
RATLAM	73	84	99
REWA	40	56	76
SAGAR	77	85	93
SATNA	51	63	95
SEHORE	49	61	126
SEONI	67	76	84
SHAHDOL	67	79	90
SHAJAPUR	55	71	94
SHIVPURI	66	83	99
SIDHI	31	44	94
SURGUJA	71	82	103
TIKAMGARH	36	49	64
UJJAIN	68	79	72
VIDISHA	62	67	79
WEST NIMAR	80	91	93

NAME OF DISTT.	ESTIMATED	UPPER VALUE OF 95 % CONFIDENCE INTERVAL	REPORTED
AJMER	56	68	96
ALWAR	57	66	100
BANSWARA	52	65	97
BARMER	22	33	87
BHARATPUR	37	48	84
BHILWARA	48	57	84
BIKANER	50	63	67
BUNDI	67	80	90
CHITTORGARH	53	64	101
CHURU	27	42	105
DHOLPUR	46	58	81
DUNGARPUR	64	76	88
GANGANAGAR	46	55	102
JAIPUR	48	59	95
JAISALMER	36	48	93
JALOR	32	45	82
JHALAWAR	77	85	90
JHUNJHUNUN	43	55	100
JODHPUR	27	37	76
KOTA	51	61	96
NAGAUR	42	54	87
PALI	46	56	92
SWAI MADHOPUR	32	45	93
SIKAR	45	54	79
SIROHI	53	72	123
TONK	50	60	95
UDAIPUR	64	75	93
DAUSA	28	37	N.A.

NAME OF DISTT.	ESTIMATED	UPPER VALUE OF 95 % CONFIDENCE INTERVAL	REPORTED
AURANGABAD	69	77	86
BEGUSARAI	43	56	109
BHAGALPUR	37	46	79
BHOJPUR	51	58	129
DARBHANGA	16	21	73
DEOGHAR	44	55	119
DHANBAD	54	64	100
GAYA	46	54	78
GIRIDIH	45	56	87
GODDA	62	73	67
GOPALGANJ	45	55	63
GUMLA	45	56	91
HAZARI BAGH	47	53	117
JAHANABAD	55	65	108
KATIHAR	54	64	62
KHAGARIA	53	62	82
LOHARDAGGA	48	54	111
MADHEPURA	60	69	102
MADHUBANI	43	55	135
MUNGER	28	33	93
MUZAFFARPUR	45	59	91
NALANDA	31	38	111
NAWADA	46	55	101
PALAMU	51	60	75
CHAMPARAN (W)	42	48	91
PATNA	46	58	108
SITAMARHI	37	44	90
CHAMPARAN (E)	33	45	77
SIWAN	42	52	101
PURNIA	49	55	45
RANCHI	43	49	89
ROHTAS	64	74	102
SAHARSA	22	32	64
DUMKA	29	38	49
SAHEBGANJ	50	60	52
SAMASTIPUR	79	87	94
SARAN	35	46	95
SINGHBHUM	37	47	84
VAISHALI	29	38	111

It is clear that the reported coverage levels remain higher than even the upper value of the 95% confidence interval of the estimated coverage level in almost all cases.

Table 3.7 presents the frequency distribution of the estimated standard errors.

TABLE 3.7 DISTRIBUTION OF S.E.

C.I.	U.P.		M.P.		RAJASTHAN		BIHAR	
	FREQ.	%	FREQ.	%	FREQ.	%	FREQ.	%
0.0 – 3.0	3	5	3	7	0	0	4	10
3.0 – 4.0	5	8	1	2	0	0	8	21
4.0 – 5.0	27	42	8	18	8	28	15	38
5.0 – 6.0	20	32	13	29	10	36	10	26
> 6.0	8	13	20	44	10	36	2	5
TOTAL	63	100	45	100	28	100	39	100

It would be seen that for as many as about 50% of the districts in the four states, the estimated standard error is upto 5% and for over 75% of the districts it is less than 6%. This indicates that the proposed methodology is most appropriate as it provides the results within 6 percentage points of the true value as against 10 percentage points claimed by WHO methodology.

As already mentioned, the proposed methodology also provides the results seprately for rural and urban areas at stratum level and by social groups. The Standard Errors of the estimates at these levels of disaggregation are presented in Table 3.8 as under.

TABLE 3.8 STANDARD ERRORS OF THE ESTIMATES OF IMMUNISATION COVERAGE OF CHILDREN

STATE	UP	MP	RAJASTHAN	BIHAR
RURAL	5.39	6.36	6.37	5.05
URBAN	10.81	12.51	12.60	10.10
STRATUM	10.57	11.92	12.01	9.66
SC/ST	14.95	15.82	14.31	13.58

It is seen that on the average the S.E. of the estimates within the district at stratum level is around 10, that for rural areas combined as 6, for urban areas as 12, for SC/ST as 15 and for non SC/ST of the population as 7.

Thus, the methodology provides estimates at desired level of disaggregation within acceptable margin of error.

COST EFFECTIVENESS

With a view to understand the cost effectiveness of the proposed methodology, Table 3.9 presents the estimates of between village travel time as well as within village enumeration time.

TABLE 3.9 - ESTIMATED TRAVEL TIME BETWEEN VILLAGE AND WITHIN VILLAGE

STATE	BETWEEN VILLAGE	WITHIN VILLAGE
U.P.	6 – 10 Hours	2 – 3 Hours
M.P.	6 – 10 Hours	2 – 3 Hours
RAJASTHAN	8 – 15 Hours	4 – 5 Hours
BIHAR	5 – 8 Hours	2 – 3 Hours

With these estimates the comparison of the cost of the survey using the proposed methodology and the WHO methodology has been worked out. It has been observed that estimated cost of covering 375 children in the proposed methodology is favourable with the cost of the survey using WHO methodlogy covering 210 children. Thus taking the efficiency and the cost of the survey together the proposed methodology is most cost effective as compared to the WHO methodology in terms of precision per unit cost.

SIZE OF THE VILLAGE

It is of interest to know whether size of the village has any influence on the level of immunisation. With this in view, Table 3.10 presents the results for four strata of the rural areas (I to IV) at the state level. Results for urban areas (stratum-V) are also presented.

05807

TABLE 3.10 - IMMUNISATION COVERAGE OF CHILDREN ACCORDING TO SIZE OF VILLAGE

STRATUM		UP	MP	RAJASTHAN	BIHAR
DPT	I	49	56	31	38
	II	52	58	36	36
	III	51	61	44	40
	IV	54	64	54	46
	V	66	79	61	64
OPV	I	48	57	31	39
	II	51	60	36	36
	III	51	63	44	42
	IV	54	66	54	46
	V	67	79	61	64
BCG	I	50	52	30	21
	II	53	54	36	21
	III	53	56	44	23
	IV	56	59	54	28
	V	65	76	63	44
MEASLES	I	39	47	24	21
	II	41	47	28	21
	III	41	52	36	22
	IV	43	57	44	23
	V	54	69	50	36

The differences in the coverage levels for four strata in all the four states were significant. The level of immunisation coverage showed increase with the size of the village

INFLUENCE OF SOCIO-ECONOMIC CHARACTERISTICS

It is important to examine the differences in the estimated coverage levels by sex, caste and the level of literacy. With this objective, the results according to sex, caste and literacy are discussed below.

SEX

Table 3.11 presents the results on immunisation coverage according to sex in the four states. It is apparent from this table that the immunisation coverage for male children was marginally higher as compared to that for female children.

TABLE 3.11 - IMMUNISATION OF CHILDREN (%) BY SEX OF CHILD

STATE		U.P.		M.P.		RAJASTHAN		BIHAR	
		MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
DPT	R	54	49	59	59	43	40	50	32
	U	67	66	79	79	63	60	64	64
OPV	R	53	49	62	62	43	40	50	32
	U	67	66	80	81	63	60	64	64
MEASLES	R	44	39	51	51	33	33	24	21
	U	56	53	70	68	54	48	36	36
B.C.G	R	52	51	56	53	42	41	24	23
	U	67	63	75	77	65	61	44	44

CASTE

Table 3.12 presents the results on immunisation coverage by caste. The estimated coverage levels for SC/ST have been observed much lower as compared to rest of the population. The difference has been observed as high as 20 percentage points in the state of Bihar, it being around 10% each for Rajasthan, M.P. and U.P.

TABLE 3.12 - IMMUNISATION OF CHILDREN (%) BY CASTE

STATE		UP		MP		RAJASTHAN		BIHAR	
		SC/ST	OTHERS	SC/ST	OTHERS	SC/ST	OTHERS	SC/ST	OTHERS
DPT	R	46	55	56	64	37	51	33	53
	U	56	68	76	82	57	68	53	74
OPV	R	45	54	58	66	37	50	34	45
	U	56	69	77	82	58	68	52	60
MEASLES	R	36	44	47	54	30	39	18	23
	U	45	56	68	72	44	55	32	37
B.C.G	R	48	56	51	61	35	45	18	24
	U	53	68	70	79	56	67	37	42

EDUCATION OF FATHER

The results on coverage levels according to educational status of the father of the child are presented in table 3.13 The levels of education considered are illiterate, just literate and those having formal education. The differences in the immunisation coverage of children for illiterate and literate father of the children were small as compared to the difference in the coverage levels between literate and with formal education of father.

TABLE 3.13 - IMMUNISATION OF CHILDREN BY LITERACY OF FATHER (%)

STATE		UP			MP			RAJASTHAN			BIHAR		
		ILL	LIT	F.ED	ILL	LIT	F.ED	ILL	LIT	F.ED	ILL	LIT	F.ED
DPT	R	37	41	60	53	60	64	33	41	58	26	32	32
	U	47	46	74	71	77	82	49	59	72	38	47	67
OPV	R	37	41	60	56	62	68	34	41	57	26	33	53
	U	47	45	74	72	79	83	50	65	71	36	45	68
MEASLES	R	29	36	48	44	54	56	28	39	46	15	23	28
	U	36	37	62	60	69	73	37	65	58	27	27	43
B.C.G	R	39	45	61	48	59	62	32	41	51	15	23	29
	U	36	37	72	68	76	82	48	69	72	25	33	51

EDUCATION OF MOTHER

The results according to education of mother are presented in table 3.14. The education of mother on child immunisation played much bigger role than the education of father. Even for literate mothers, immunisation coverage of the children was much higher as compared to those with illiterate mothers.

TABLE 3.14 - IMMUNISATION OF CHILDREN BY LITERACY OF MOTHER (%)

STATE		UP			MP			RAJASTHAN			BIHAR		
		ILL	LIT	F.ED	ILL	LIT	F.ED	ILL	LIT	F.ED	ILL	LIT	F.ED
DPT	R	46	57	72	56	64	70	40	47	73	32	45	65
	U	53	77	80	71	84	85	55	78	84	46	61	76
OPV	R	45	56	71	60	66	71	41	64	75	34	45	64
	U	53	77	81	72	82	86	55	80	84	46	60	75
MEASLES	R	35	49	60	48	57	60	32	41	51	19	27	35
	U	41	50	66	60	73	76	48	71	72	32	40	48
B.C.G	R	47	59	72	52	61	66	40	57	68	19	26	36
	U	53	61	78	67	78	81	58	84	83	34	48	57

SOURCE OF IMMUNISATION

The sources of immunisation considered in the study are Hospital, Health Centre, Out reach Govt., Out reach Private and non-Govt./Private etc. These have been grouped under two broad heads, viz., Govt. and Private only. Table 3.15 presents the percentage of immunisation done by Government.

TABLE 3.15 - IMMUNISATION BY GOVERNMENT (%)

STATE		SOCIAL GROUPS		FATHER'S LITERACY			MOTHER'S LITERACY		
		SC/ST	OTHERS	ILL	LIT	F.ED	ILL	LIT	F.ED
U.P.	R	97	94	97	92	96	96	92	92
	U	89	89	88	88	89	92	83	87
M.P.	R	99	99	97	98	79	99	100	99
	U	98	98	98	98	97	98	99	97
RAJASTHAN	R	97	97	97	97	97	97	98	98
	U	97	97	98	97	97	98	97	92
BIHAR	R	88	82	88	78	81	86	73	75
	U	72	72	76	53	71	76	53	69

It would appear that in almost all cases the source of immunisation was Govt. and share of Private and Voluntary organisation was less then 5 percent except in Bihar where it was about 13 percent in rural areas and 28% in urban areas. No differences were observed in the results according to stratum and social groups. Those utilising the private services were mainly literates. In urban areas, in the states of U.P. and Bihar about 10 percent were utilising private services.

Reasons for Non-immunisation

For a programme to be successful, it is important to know the reasons for non-immunisation in addition to the present level of immunisation. This information can be used in modifying the approach to the programme so as to achieve the ultimate target of universal immunisation. It is very difficult to elicit information about the reasons for non-immunisation when the literacy level in rural areas is so low. The respondents were asked what they considered as the main reason without any probing. The responses were classified into several alternatives provided to the investigator. The reasons considered while collecting the information are grouped under three heads namely lack of awareness, lack of motivation and obstacles to facilities. Table 3.16 provides the details.

TABLE 3.16 - REASONS FOR NON-IMMUNISATION

STATE	10	20	30
U.P.	42	20	38
M.P.	58	17	25
RAJASTHAN	46	14	40
BIHAR	60	18	22

10 Lack of Awareness, 20 Lack of Motivation 30 Obstacles

It would appear from this that the lack of information, lack of motivation and obstacles accounted for 42, 20 & 38% of non- immunisation in U.P., 58, 17 & 25 % in M.P., 46, 14 & 40% in Rajasthan and 60, 18 & 22% in Bihar.

In order to understand the reasons separately for different social groups, according to level of literacy, Tables 3.17 to 3.19 provide the details.

TABLE 3.17 - REASONS FOR NON-IMMUNISATION BY CASTE (%)

U.P.

REASON	RURAL		URBAN	
	SC/ST	OTHERS	SC/ST	OTHERS
10	25	19	22	10
20	10	8	8	10
30	19	18	14	12
TOTAL	54	45	44	32
% Imm	46	55	56	68

M.P.

REASON	RURAL		URBAN	
	SC/ST	OTHERS	SC/ST	OTHERS
10	28	20	15	10
20	6	6	5	5
30	10	10	4	3
TOTAL	44	36	24	18
% Imm	56	64	76	82

RAJASTHAN

REASON	RURAL		URBAN	
	SC/ST	OTHERS	SC/ST	OTHERS
10	31	18	18	13
20	9	6	6	4
30	23	25	19	15
TOTAL	63	49	43	32
% Imm	37	51	57	68

BIHAR

REASON	RURAL		URBAN	
	SC/ST	OTHERS	SC/ST	OTHERS
10	39	28	28	17
20	15	8	12	4
30	13	11	7	5
TOTAL	67	47	47	26
% Imm	33	53	53	74

TABLE 3.18 REASONS FOR NON-IMMUNISATION BY EDUCATION OF MOTHER (%)

U.P.

REASON	RURAL			URBAN		
	ILL	LIT	F.ED	ILL	LIT	F.ED
10	22	15	8	15	6	4
20	10	9	5	16	4	3
30	22	19	15	16	13	5
TOTAL	54	43	28	47	23	12
% Imm	46	57	72	53	77	88

M.P.

REASON	RURAL			URBAN		
	ILL	LIT	F.ED	ILL	LIT	F.ED
10	25	21	12	18	6	6
20	6	6	4	2	3	3
30	13	9	14	9	7	6
TOTAL	44	36	30	29	16	15
% Imm	56	64	70	71	84	85

RAJASTHAN

REASON	RURAL			URBAN		
	ILL	LIT	F.ED	ILL	LIT	F.ED
10	26	16	8	33	25	15
20	8	7	5	7	6	6
30	26	30	14	28	24	14
TOTAL	60	53	27	58	55	35
% Imm	40	47	73	32	45	65

BIHAR

REASON	RURAL			URBAN		
	ILL	LIT	F.ED	ILL	LIT	F.ED
10	37	30	18	31	12	13
20	11	4	4	9	9	3
30	20	21	13	14	18	8
TOTAL	68	55	37	54	39	24
% Imm	32	45	65	46	61	76

TABLE 3.19 REASONS FOR NON-IMMUNISATION BY EDUCATION OF FATHER (%)

U.P.

REASON	RURAL			URBAN		
	ILL	LIT	F.ED	ILL	LIT	F.ED
10	25	30	14	17	20	7
20	13	12	7	22	20	7
30	25	17	19	14	14	12
TOTAL	63	59	40	53	54	26
% Imm	37	41	60	47	46	74

M.P.

REASON	RURAL			URBAN		
	ILL	LIT	F.ED	ILL	LIT	F.ED
10	28	27	18	20	13	10
20	4	5	6	2	2	2
30	15	8	12	7	8	6
TOTAL	47	40	36	29	23	18
% Imm	53	60	64	71	77	82

RAJASTHAN

REASON	RURAL			URBAN		
	ILL	LIT	F.ED	ILL	LIT	F.ED
10	27	17	14	23	22	11
20	9	8	6	5	1	5
30	31	34	22	23	18	12
TOTAL	67	59	42	51	41	28
% Imm	33	41	58	49	59	72

BIHAR

REASON	RURAL			URBAN		
	ILL	LIT	F.ED	ILL	LIT	F.ED
10	40	38	35	41	36	18
20	12	8	11	8	2	6
30	22	22	22	13	15	9
TOTAL	74	68	68	63	53	33
% Imm	26	32	32	38	47	67

It is apparent that lack of awareness was generally more among SC/ST and illiterate parents as compared to the rest of the population.

The immunisation coverage of children as evident from the results presented, clearly showed variations in coverge from state to state and was influenced by factors like size of the village, socio-economic status, literacy level and motivational level of parents particularly those of the mothers. The precision of estimates of coverage derived through this methodology were within the desired limits. This methodology is also cost effective.

IMMUNISATION OF MOTHER

In this study information about the immunisation status against tetanus of mothers of children upto 1 year of age has been collected through a separate schedule. In addition, the information on ante-natal care and delivery was also collected. This chapter presents an analysis of the same. Here also the results are presented at aggregate level as well as according to social groups, literacy of husband and self etc.

STATE LEVEL

Information on the Immunisation Status of mothers for the four states is summarised in table 4.1 below

TABLE 4.1 IMMUNISATION STATUS OF PREGNANT MOTHERS FOR TT2/B (%)

STATE	TT2 + B COVERAGE LEVEL
U.P.	53
M.P.	58
RAJASTHAN	41
BIHAR	42

It would be seen that the percentage of pregnant mothers receiving two doses of Tetanus Toxide (TT2) or Booster was 53% in U.P., 58% in M.P., 41% in Rajasthan and 42% in Bihar. Thus, the level of coverage for mothers is comparable with those of children in respect of DPT/OPV.

The results at disaggregated level for the four strata and separately for rural and urban areas are presented in table 4.2.

TABLE 4.2 IMMUNISATION OF PREGNANT MOTHERS (%)

– Rural/Urban

STATE	STRATUM (RURAL)				RURAL	URBAN	COMBINED
	I	II	III	IV			
U.P.	45	50	52	52	50	68	53
M.P.	54	57	57	64	57	73	58
RAJASTHAN	28	28	35	48	35	63	41
BIHAR	36	39	38	46	40	60	42

The immunisation coverage level of pregnant mothers was highest for stratum IV followed by, stratum (III or II) and I. Thus, the immunisation coverage showed increase with the increase in size of the village. The trend is similar to that for immunisation of children. The immunisation coverage in urban areas was higher as compared to that in rural areas.

INFLUENCE OF SOCIO-ECONOMIC FACTORS

Similar to that in case of children, results have been obtained for SC/ST and rest of the population as well as according to the literacy level which are discussed below.

CASTE

Table 4.3 presents the results on immunisation coverage of mothers according to social groups, i.e., SC/ST and others.

TABLE 4.3 IMMUNISATION OF PREGNANT MOTHERS BY CASTE (%)

STATE		SC/ST	OTHERS
U.P.	R	44	54
	U	57	70
M.P.	R	53	62
	U	70	75
RAJASTHAN	R	29	42
	U	57	66
BIHAR	R	31	44
	U	58	62

The immunisation status for pregnant mothers belonging to SC/ST was lower as compared to that for rest of the population.

EDUCATION

The results on immunisation coverage of pregnant mothers according to their education are presented in table 4.4.

TABLE 4.4 IMMUNISATION OF PREGNANT MOTHERS BY LITERACY (%)

STATE		ILLITERATE	LITERATE	F. EDUCATION
U.P.	R	44	52	73
	U	54	63	81
M.P.	R	53	62	71
	U	64	62	80
RAJASTHAN	R	32	65	66
	U	54	76	78
BIHAR	R	29	46	59
	U	44	59	75

Evidently, the immunisation status of illiterate mother was much lower as compared to literate mothers. The differences were further more with mothers having formal education.

The results according to literacy of husband are presented in table 4.5.

TABLE 4.5 IMMUNISATION OF PREGNANT MOTHERS BY HUSBAND'S LITERACY (%)

STATE		ILLITERATE	LITERATE	F. EDUCATION
U.P.	R	37	46	61
	U	48	50	75
M.P.	R	51	57	65
	U	63	69	77
RAJASTHAN	R	26	34	47
	U	45	67	70
BIHAR	R	25	43	53
	U	43	60	73

The difference in the immunisation of pregnant mothers having illiterate husband with those having literate husband was of the order of about 18% for Rajasthan and Bihar and about 7% for U.P. and M.P. The difference between formally educated husband and literate husband was also of the same order.

AT DISTRICT LEVEL

Tables4.6 (a) to 4.6(d) provide the results of immunisation coverage of pregnant mothers at district level for the four states. Table 4.7 summarises these results in the form of a frequency table.

TABLE 4.6(a) DISTRICT WISE IMMUNISATION COVERAGE OF PREGNANT MOTHERS (%)

U.P.

NAME OF DISTT.	IMMUNISATION	NAME OF DISTT.	IMMUNISATION
AGRA	46	KANPUR (RURAL)	57
ALIGARH	38	KANPUR (URBAN)	63
ALLAHABAD	44	KHERI	61
ALMORA	87	LALITPUR	58
AZAMGARH	50	LUCKNOW	53
BAHRAICH	28	MAINPURI	46
BALLIA	71	MATHURA	47
BANDA	46	NEERUT	62
BARABANKI	49	MIRZAPUR	43
BARAEILLY	68	MORADABAD	62
BASTI	60	MUZAFFARNAGAR	47
BIJNOR	69	NAINITAL	75
BUDAUN	55	PILIBHIT	51
BULANDSHAHR	57	PITHORAGARH	71
CHAMOLI	62	PRATAP GARH	60
DEHRADUN	78	RAE BARELI	62
DEORIA	57	RAMPUR	62
ETAH	51	SAHARANPUR	60
ETAWAH	37	SHAHJAHANPUR	58
FAIZABAD	47	SITAPUR	48
FARRUKHABAD	37	SULTANPUR	58
FATEHPUR	53	TEHRI GARHWAL	45
PAURI GARHWAL	55	UNNAO	50
GHAZIABAD	56	UTTARKASHI	37
GHAZIPUR	51	VARANASI	62
GONDA	50	MAHARAJGANJ	44
GORAKHPUR	60	FEROZABAD	48
HAMIRPUR	34	SIDDARTHNAGAR	48
HARDOI	33	MAU	52
JALAUN	29	HARIDWAR	66
JAUNPUR	54	SONBHADRA	49
JHANSI	38		
AVERAGE			53

TABLE 4.6 (b) DISTRICT WISE IMMUNISATION COVERAGE OF PREGNANT MOTHERS (%)

M.P.

NAME OF DISTT.	IMMUNISATION
BALAGHAT	70
BASTAR	45
BETUL	73
BHIND	58
BHOPAL	64
BILASPUR	70
CHHATARPUR	59
CHHINDWARA	68
DAMOH	56
DATIA	36
DEWAS	44
DHAR	59
DURG	68
EAST NIMAR	54
GUNA	51
GWALIOR	61
HOSHANGABAD	65
INDORE	56
JABALPUR	60
JHABUA	54
MANDLA	71
MANDSAUR	74
MORENA	45
NARSIMHAPUR	67
PANA	46
RAIGARH	79
RAIPUR	65
RAISEN	50
RAJGARH	66
RAJNANDGAON	71
RATLAM	70
REWA	37
SAGAR	70
SATNA	49
SEHORE	47
SEONI	62
SHAHDOL	59
SHAJAPUR	52
SHIVPURI	39
SIDHI	26
SURGUJA	70
TIKAMGARH	34
UJJAIN	62
VIDISHA	60
WEST NIWAR	68
AVERAGE	58

TABLE 4.6 (C) DISTRICT WISE IMMUNISATION COVERAGE OF PREGNANT MOTHERS (%)

RAJASTHAN

NAME OF DISTT.	IMMUNISATION
AJMER	57
ALWAR	52
BANSWARA	40
BARMER	23
BHARATPUR	33
BHILWARA	46
BIKANER	26
BUNDI	63
CHITTORGARH	56
CHURU	27
DHOLPUR	50
DUNGARPUR	61
GANGANAGAR	48
JAIPUR	61
JAISALMER	20
JALOR	22
JHALAWAR	53
JHUNJHUNU	42
JODHPUR	19
KOTA	36
NAGAUR	37
PALI	43
SWAI MADHOPUR	28
SIKAR	30
SIROHI	43
TONK	47
UDAIPUR	58
DAUSA	28
AVERAGE	41

TABLE 4.6 (d) DISTRICT WISE IMMUNISATION COVERAGE OF PREGNANT MOTHERS (%)

BIHAR

NAME OF DISTT.	IMMUNISATION	NAME OF DISTT.	IMMUNISATION
AURANGABAD	54	MUZAFFARPUR	54
BEGUSARAI	43	NALANDA	19
BHAGALPUR	32	NAWADA	30
BHOJPUR	29	PALAMU	55
DARBHANGA	21	CHAMPARAN (W)	48
DEOGHAR	43	PATNA	50
DHANBAD	50	SITAMARHI	35
GAYA	42	CHAMPARAN (E)	42
GIRIDIH	60	SIWAN	48
GODDA	66	PURNIA	23
GOPALGANJ	58	RANCHI	18
GUMLA	29	ROHTAS	43
HAZARIBAGH	57	SAHARSA	25
JAHANABAD	20	DUMKA	27
KATIHAR	58	SAHEBGANJ	42
KHAGARIA	27	SAMASTIPUR	55
LOHARDAGGA	43	SARAN	38
MADHEPURA	58	SINGHBHUM	37
MADHUBANI	41	VAISHALI	31
MUGER	22		
AVERAGE			40

TABLE 4.7 - DISTRIBUTION OF DISTRICT BY PERCENTAGE IMMUNISATION OF PREGNANT MOTHER

STATE	≤ 33	33–40	40–50	50–60	60–75	> 75
U.P.	3	6	18	19	15	2
M.P.	1	4	8	11	20	1
RAJASTHAN	10	3	7	5	3	0
BIHAR	14	2	12	10	1	0

It would appear that the proportion of districts having 33% or lower immunisation coverage were as high as 33% for Bihar and 32% for Rajasthan. In the states of U.P. and M.P. the corresponding proportions were 5% and 4% respectively. The districts having coverage levels between 33 to 40% were 9% each in U.P. and M.P., 11% in Rajasthan and none in Bihar; between 40 to 50% were 29% in U.P., 16% in M.P., 29% in Rajasthan and

33% in Bihar; and those reporting 50 to 75% were 54% in U.P., 69% in M.P., 29% in Rajasthan and 33% in Bihar. Further, the number of districts reporting more than 75% coverage were only a few.

ANTE-NATAL CARE

In the study, information has been collected on ante-natal visits and also on whether the pregnant mother has taken iron and folic acid tablets. Tables 4.8 and 4.9 provide the necessary details.

TABLE 4.8 - MOTHERS RECEIVING ANTE NATAL CARE (%)

STRATUM (RURAL)					RURAL	URBAN	COMBINED
STATE	I	II	III	IV			
U.P.	47	51	53	59	53	70	54
M.P.	54	55	56	60	58	82	62
RAJASTHAN	33	38	46	58	44	67	48
BIHAR	28	29	28	37	31	50	34

TABLE 4.9 - MOTHERS TAKING IRON & FOLIC ACID TABLETS (%)

STRATUM (RURAL)					RURAL	URBAN	COMBINED
STATE	I	II	III	IV			
U.P.	42	47	47	47	46	60	49
M.P.	54	57	56	60	57	76	59
RAJASTHAN	41	37	50	59	47	65	50
BIHAR	21	25	23	27	24	33	26

Similarly those taking iron and folic acid tablets were 49% in U.P., 59% in M.P., 50% in Rajasthan and 26% in Bihar.

With a view to understand the extent of variation in ante-natal care among mothers of different socio-economic groups and with varying levels of literacy, the results are presented in Table 4.10.

TABLE 4.10 - MOTHERS RECEIVING ANTE NATAL CARE BY CASTE & LITERACY (%)

STATE		SOCIAL GROUPS		HUSBAND'S LITERACY			LITERACY OF SELF		
		SC/ST	OTHERS	ILL	LIT	F.ED	ILL	LIT	F.ED
U.P.	R	46	54	38	46	62	45	55	71
	U	62	72	51	63	77	57	73	83
M.P.	R	54	65	58	63	64	56	70	71
	U	81	83	76	80	85	76	86	85
RAJASTHAN	R	39	50	34	41	56	40	59	74
	U	62	71	49	62	75	58	82	82
BIHAR	R	25	34	23	47	40	23	41	43
	U	47	52	40	55	58	43	59	61

Evidently the proportion of pregnant mothers getting ante-natal care were relatively very low for SC/ST as compared to the rest of the population. The same low level was observed for illiterate mothers as compared to the rest. The differences were significant for illiterate and literate mothers. The differences further widened if the literacy level of the mothers was the formal education. Literacy level of the husband also played a role in this regard. However, significant differences were observed only when the literacy of the husband was formal education and not just literate.

Table 4.11 presents the information on pregnant mothers taking iron & folic acid tablets.

TABLE 4.11 - MOTHERS TAKING IRON & FOLIC ACID TABLETS BY CASTE & LITERACY (%)

STATE		SOCIAL GROUPS		HUSBAND'S LITERACY			LITERACY OF SELF		
		SC/ST	OTHERS	ILL	LIT	F.ED	ILL	LIT	F.ED
U.P.	R	42	50	34	42	55	41	48	66
	U	51	61	42	44	65	48	57	70
M.P.	R	53	61	53	56	62	53	61	67
	U	75	77	65	55	79	68	68	79
RAJASTHAN	R	43	53	40	42	58	44	61	73
	U	62	69	51	31	72	59	50	78
BIHAR	R	19	26	16	21	30	19	27	34
	U	31	34	18	25	40	25	34	40

The proportion of pregnant mothers belonging to SC/ST taking iron & folic acid tablets was lower as compared to the corresponding proportion of pregnant mothers belonging to the rest of the population. Also the proportion of illiterate pregnant mothers taking iron & folic acid tablets was much lower than those of literate mothers which in turn was lower than those of pregnant mothers with formal education. Similar comments held true with respect to the literacy level of the husbands.

DELIVERY

Information on the delivery details were also collected in the study. The collected information relates to whether the delivery was performed at home or in Govt. Hospital, Health Centre, Private Hospital or together with who attended the delivery. Tables 4.12(a), 4.12(b) & 4.13 provide the necessary details.

TABLE 4.12 (a) DELIVERIES AT HOME (%)

STATE	STRATUM (RURAL)				RURAL	URBAN	COMBINED
	I	II	III	IV			
U.P.	94	94	93	87	92	75	89
M.P.	93	92	91	86	91	63	85
RAJASTHAN	94	91	93	87	91	68	87
BIHAR	91	89	91	85	89	64	84

TABLE 4.12 (B) DELIVERIES AT HOME BY CASTE & LITERACY (%)

STATE		SOCIAL GROUPS		HUSBAND'S LITERACY			LITERACY OF SELF		
		SC/ST	OTHERS	ILL	LIT	F.ED	ILL	LIT	F.ED
U.P.	R	96	92	97	95	91	97	93	85
	U	81	74	89	77	71	87	71	64
M.P.	R	93	88	93	89	87	93	84	82
	U	72	61	69	61	59	72	60	56
RAJASTHAN	R	95	89	96	89	88	94	85	79
	U	79	61	83	56	63	79	36	54
BIHAR	R	92	88	91	83	85	92	83	82
	U	65	63	72	59	60	73	55	56

TABLE 4.13 DELIVERIES ATTENDED BY DIFFERENT FUNCTIONARIES (%)

STATE	DAI			HEALTH STAFF	OTHERS
	UNTRAINED	TRAINED	TOTAL		
U.P.	57	22	79	19	2
M.P.	47	37	84	16	0
RAJASTHAN	67	11	78	21	1
BIHAR	78	14	92	8	0

It will be seen that as many as 90% of the deliveries took place at home which were mainly attended by village dais. The proportion of deliveries attended by trained dais was ofthe magnitude of about 20%. The proportion of pregnant mothers in urban areas utilising the hospital facilities for deliveries was much higher as compared to that for rural areas. Also there is decline in the delivery at home with increase in literacy.

SOURCE OF IMMUNISATION

The distribution of the mothers receiving immunisation by caste and literacy according to source of Immunisation is presented in table 4.14. The sources considered are Hospital, PHC, Outreach Govt., Outreach Private etc. and have been grouped under two broad heads Govt. and Private only. In almost all the cases the source of immunisation was Govt. and share of Private and voluntary organisation was just insignificant. Only literate mothers were seen to be utilising the private services.

TABLE 4.14 - PREGNANT MOTHERS RECEIVING IMMUNISATION THROUGH GOVERNMENT SOURCES BY CASTE & LITERACY (%)

STATE		SOCIAL GROUPS		HUSBAND'S LITERACY			LITERACY OF SELF		
		SC/ST	OTHERS	ILL	LIT	F.ED	ILL	LIT	F.ED
U.P.	R	90	89	90	83	89	90	84	88
	U	83	81	73	62	81	84	73	80
M.P.	R	96	95	96	92	95	96	90	93
	U	91	88	83	65	87	88	74	84
RAJASTHAN	R	96	97	97	78	97	97	78	95
	U	96	97	97	100	96	96	100	96
BIHAR	R	87	72	76	80	73	79	76	71
	U	74	64	73	82	55	69	73	64

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REASONS FOR NON-IMMUNISATION

The information on reasons for non-immunisation is very crucial and can be used in modifying the approach to the programme so as to achieve the ultimate target of universal immunisation. As in case of children the reasons considered for non-immunisation have been grouped under three heads, viz., lack of awareness, lack of motivation and obstacles. Results are presented in Table 4.15.

It would appear that lack of awareness accounted for 47% of non- immunisation in U.P., 59% in M.P., 49% in Rajasthan and 69% in Bihar. The lack of motivation accounted for 14% each in the states of M.P., Rajasthan and Bihar and 23% in U.P.. Obstacles contributed for 18% of non-immunisation in Bihar, 27% in M.P., 30% in U.P. and 36% in Rajasthan.

TABLE 4.15 REASONS FOR NON-IMMUNISATION OF PREGNANT MOTHERS (%)

STATE	10	20	30
U.P.	47	23	30
M.P.	59	14	27
RAJASTHAN	49	15	36
BIHAR	69	13	18

10 Lack of Awareness, 20 Lack of Motivation 30 Obstacles

In order to understand the differences in reasons for non- immunisation by social groups, table 4.16 presents the results. It would be seen that lack of awareness and lack of motivation for non-immunisation was more among SC/ST as compared to the rest of the population.

TABLE 4.16 REASON FOR NON-IMMUNISTION OF PREGNANT MOTHER BY CASTE (%)

U.P.

REASON	RURAL		URBAN	
	SC/ST	OTHERS	SC/ST	OTHERS
10	27	20	18	14
20	12	11	10	7
30	17	15	15	9
TOTAL	56	46	43	30
% Imm	44	54	57	70

M.P.

REASON	RURAL		URBAN	
	SC/ST	OTHERS	SC/ST	OTHERS
10	24	20	17	14
20	5	5	3	4
30	12	8	10	7
TOTAL	42	33	30	25
% Ilm	58	67	70	75

RAJASTHAN

REASON	RURAL		URBAN	
	SC/ST	OTHERS	SC/ST	OTHERS
10	35	25	24	20
20	11	8	7	6
30	25	25	12	8
TOTAL	71	58	43	34
% Imm	29	42	57	66

BIHAR

REASON	RURAL		URBAN	
	SC/ST	OTHERS	SC/ST	OTHERS
10	45	37	29	28
20	10	8	7	5
30	14	11	6	5
TOTAL	67	56	42	38
% Imm	31	44	58	62

Tables 4.17 and 4.18 present the information on reasons for non- immunisation by education of self and husband respectively.

TABLE 4.17 REASONS FOR NON-IMMUNISATION OF PREGNANT MOTHER BY EDUCATION (%)

U.P.

REASON	RURAL			URBAN		
	ILL	LIT	F.ED	ILL	LIT	F.ED
10	26	17	11	23	11	8
20	12	11	6	11	9	4
30	18	20	10	12	17	7
TOTAL	56	48	27	46	37	19
% Imm	44	52	73	54	63	81

M.P.

REASON	RURAL			URBAN		
	ILL	LIT	F.ED	ILL	LIT	F.ED
10	25	21	14	21	22	13
20	6	9	4	5	7	2
30	11	1	7	10	9	5
TOTAL	42	31	25	36	38	20
% Imm	58	69	75	64	62	80

RAJASTHAN

REASON	RURAL			URBAN		
	ILL	LIT	F.ED	ILL	LIT	F.ED
10	31	20	13	26	12	12
20	10	5	5	9	5	4
30	27	8	16	11	7	6
TOTAL	68	33	34	46	24	22
%. Imm	32	65	66	54	76	78

BIHAR

REASON	RURAL			URBAN		
	ILL	LIT	F.ED	ILL	LIT	F.ED
10	47	33	26	37	24	16
20	10	10	5	11	7	3
30	14	11	10	8	10	6
TOTAL	71	54	41	56	41	25
% Imm	29	46	59	44	59	75

TABLE 4.18 REASONS FOR NON-IMMUNISATION OF PREGNANT MOTHER BY EDUCATION OF HUSBAND (%)

U.P.

REASON	RURAL			URBAN		
	ILL	LIT	F.ED	ILL	LIT	F.ED
10	32	25	16	25	20	11
20	14	11	9	13	12	6
30	17	18	14	14	18	8
TOTAL	63	54	39	52	50	25
% Imm	37	46	61	48	50	75

M.P.

REASON	RURAL			URBAN		
	ILL	LIT	F.ED	ILL	LIT	F.ED
10	25	22	18	27	21	7
20	6	6	4	4	5	9
30	13	10	8	6	6	7
TOTAL	44	38	30	37	32	23
% Imm	56	62	70	63	69	77

RAJASTHAN

REASON	RURAL			URBAN		
	ILL	LIT	F.ED	ILL	LIT	F.ED
10	34	28	24	34	16	18
20	10	11	7	9	7	5
30	30	27	22	22	10	7
TOTAL	74	66	53	65	33	22
% Imm	26	34	47	45	67	70

BIHAR

REASON	RURAL			URBAN		
	ILL	LIT	F.ED	ILL	LIT	F.ED
10	50	40	31	44	29	20
20	11	7	6	7	6	3
30	14	10	10	6	5	4
TOTAL	75	57	47	57	40	27
% Imm	25	43	53	43	60	73

Higher proportion of illiterate females reported 'lack of awareness' as the reason for non-immunisation as compared to literate and educated females.

Thus,the results presented in this chapter on immunisation of pregnant mothers seem to be on the lines similar to those of children presented in chapter-III.

COMPARISON WITH WHO METHODOLOGY

It is worthwhile comparing the methodology adopted by the Institute with that recommended by WHO known as 30 cluster sampling methodology. Results for number of districts are available using WHO methodology but the same cannot be used for comparison because of difference in the reference periods as well as employing different sets of investigators. For attempting a valid comparison it is desirable that the reference period for the data using WHO methodology and IRMS methodology are the same and that these have been collected by the same field agency (i.e. same set of investigators). Fortunately, when this report was in the press, attention was drawn by Ministry of Health & Family Welfare to a report on comparison of two methodologies brought out by the Indian Institute of Health Management Research (IIHMR), Jaipur, Rajasthan, using the data for four typical districts of Rajasthan, namely, Bharatpur, Sirohi, Churu & Jaisalmer.

The IIHMR study, sponsored by the UNICEF, attempts to compare the results obtained by adopting two methodologies in four randomly selected districts of Rajasthan. While the coverage evaluation in these selected districts was carried out using IRMS methodology for another major study (i.e. present study- Methodological Investigations on Surveys of Immunisation Coverage) by the IIHMR, sponsored by the Institute for Research in Medical Statistics (ICMR) New Delhi and simultaneously in these four districts coverage evaluation was done using WHO methodology to test the difference between the two methodologies at the same period of time.

The survey was conducted by using the same questionnaire, but by two different teams of investigators to avoid possible biases due to the questionnaire format as well as of the investigators.

Summary of the salient findings of the IIHMR study are presented here.

DISTRICT CHARACTERSTICS & HYPOTHESIS SETTING

Table 5.1 gives some of the general characteristics of the four selected districts.

TABLE - 5.1 SOCIO-DEMOGRAPHIC INDICATORS OF FOUR DISTRICTS

INDICATORS	DISTRICTS			
	JAISALMER	CHURU	SIROHI	BHARATPUR
1. Type of Region	Desert	Semi-Desert	Hilly/Semi-Plain	Plain
2. Decimal growth rate (%)	14.4	30.5	20.5	26.7
3. Density	9	91	127	325
4. Sex Ratio (F/Mx1000)	810	940	950	835
5. Literacy (%)	23.9	27.2	26.0	33.7
6. SC Popn. (%)	14.5	19.5	18.7	21.3
7. ST Popn. (%)	4.4	0.5	23.1	3.0
8. % Cultivable land	89.4	95.9	50.1	75.4
9. % Irrigated land among cultivable land	0.0	0.0	24.6	31.9

Table 5.1 shows that all the socio-demographic characterisitcs varied largely among the four selected districts, i.e. sex-ratio (from 810 to 950); literacy level (24% to 34%); SC population (15% to 21%); ST population (1% to 23%); and percentage of cultivable land (from 50% to 96%). The advantages of such large variations in district characterisitcs in methodology testing would be, in depicting the influence of different terrain and conditions (set-ups), on the biases which the two methodologies introduce in immunisation coverage levels.

The hypotheses tested were; the difference in the two methodologies could be due to a) sample size difference and b) by omission of the outer/isolated segment of the population because the starting point in WHO methodology is centre of the village, mostly in comparatively larger villages. It was hypothesised that where population density is low (Jaisalmer villages are mostly small and in the form of hemlets), a sample of 7 children is likely to

cover all the segments of population. On the other hand, when the population density is very high, the segregated segments of the population, which is mostly the characteristics of different segments, are likely to become more homogeneous, of course to the extent the inter-mix of the population has taken place. In such condition the biases would be the minimum by adopting any of the two methodologies. Those districts having medium size villages and the different segments of their population have maintained their identity, an upward biased in results is expected using WHO methodology.

COMPARISON OF IMMUNISATION COVERAGE

Table 5.2 presents the results on the immunisation coverage.

TABLE - 5.2 ESTIMATED IMMUNISATION COVERAGE LEVELS IN FOUR DISTRICTS USING WHO AND IRMS METHODOLOGY.

VACCINE	DISTRICTS							
	SIROHI		CHURU		JAISALMER		BHARATPUR	
	WHO	IRMS	WHO	IRMS	WHO	IRMS	WHO	IRMS
DPT I	76.7	64.9	54.0	40.1	38.1	47.3	52.4	48.8
doses II	69.0	60.5	46.0	32.8	29.0	41.1	43.3	43.2
III	63.8	55.1	37.6	27.1	24.3	34.8	38.6	37.3
POLIO I	73.3	64.9	53.1	39.7	36.7	46.5	52.4	48.5
doses II	67.6	58.2	44.6	33.5	29.0	41.1	43.3	42.7
III	62.4	54.8	37.6	27.3	23.8	34.6	38.6	36.8
MEASLES	55.2	44.7	26.8	14.0	13.8	29.5	28.1	27.2
doses BCG	70.9	56.6	40.4	28.8	29.5	35.7	36.2	35.5
doses								
TT I	56.3	44.4	38.4	23.0	21.9	23.1	35.7	34.1
doses II	50.7	42.1	34.1	23.8	19.0	17.9	33.3	32.5
Total (N)	210	375	210	375	210	375	210	375

The above results, clearly bring-out that while in normal Indian villages with sectoral formation (e,g,; in Sirohi and Churu districts) an upward bias was found in estimates obtained by using WHO methodology, in case of small and hamlet type of villages (e.g.; Jaisalmer) the upward bias was found when IRMS methodology was used. The differences in both the

cases were statistically significant. Interestingly in high density districts like Bharatpur, where sectoral segregation in villages is negligible, the two methodologies came out with similar estimates and no significant difference was found.

The clubbing of the estimates for all the four districts covered in the study and analysing the differences brought out that the differences became statistically insignificant in case of most of the vaccine coverage estimates.

IRMS developed methodology scores better rating over WHO methodology, especially when coverage evaluation is attempted in medium size villages with existence of socio-economic segregation - which still remains the main characteristic of the Indian villages.

REASONS FOR NON IMMUNISATION

Table 5.3 presents the results on the reasons for non- immunisation

TABLE - 5.3 MAJOR REASONS FOR NON-ACCEPTANCE/DISCONTINUATION OF IMMUNISATION VACCINE (DISTRICTWISE) % DISTRIBUTION FOR DISTRICTS

	% DISTRIBUTION FOR DISTRICTS									
	SIROHI		CHURU		JAISALMER		BHARATPUR		ALL	
MAJOR REASONS	WHO	IRMS	WHO	IRMS	WHO	IRMS	WHO	IRMS	WHO	IRMS
Lack of Information	26.3	26.2	37.4	40.7	25.3	37.9	28.6	17.6	29.4	31.0
Lack of Motivation	12.3	21.2	6.9	0.3	8.3	2.7	1.2	13.9	6.8	8.5
Other Obstacles	61.4	52.6	55.8	58.9	66.3	59.3	70.1	68.3	63.8	60.5
Total (N)	114	187	163	312	205	258	164	294	646	1051

It is interesting to note that "lack of information" figured high in Churu and Jaisalmer districts when IRMS methodology is used as compared to that in Sirohi (almost equal) and Bharatpur (only 18% against 29% in case of WHO methodology). The district background

and characteristics reflect that the reasons mentioned in case of IRMS methodology are much closer to the truth than those obtained by using WHO methodology. It is obvious that "terrain -wise difficult areas" will face more problems in receiving information than those "easier" ones, in terms of lack of motivation".

COMMENTS

We broadly agree with the findings of Indian Institute of Health Management Research, Jaipur on the comparison of two methodologies. However, following observations are relevant in this regard.

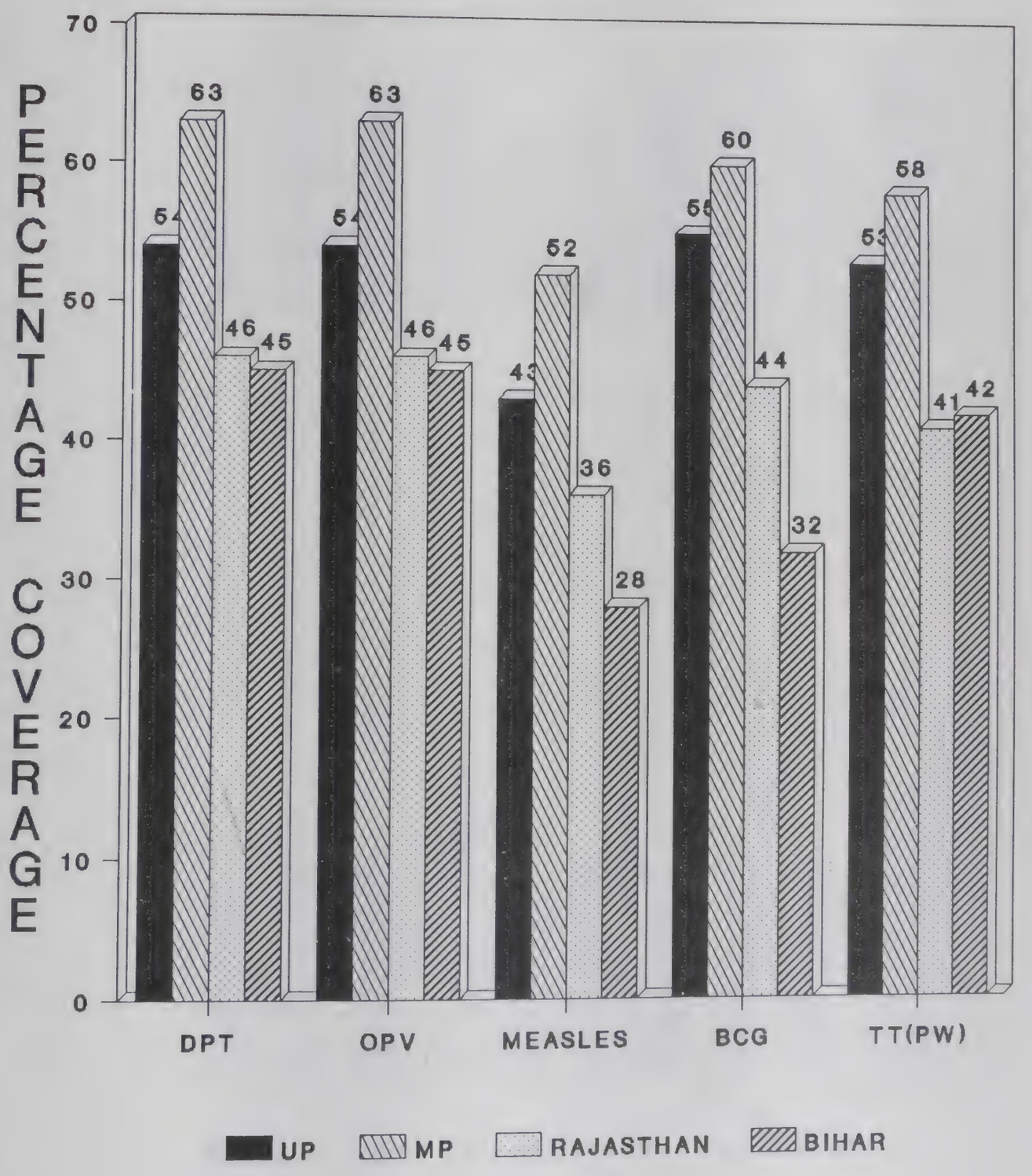
1 It is not correct to say that on an overall difference in the results by the two methodologies average out by pooling of the data. Average for four districts cannot be used for generalisation for the entire state of Rajasthan. For generalisation, appropriate weights have to be given for each type of district in the state.

2 The points considered in the IRMS methodology are that coverage levels vary according to size of village as well as according to the socio-economic groups. These two factors have been incorporated in the methodology developed by IRMS. The report of IIHMR., Jaipur comments mainly on the inter-mixing of the population on the basis of population density and does not consider the other factor, namely, the size of the village. WHO methodology selects villages according to probability proportional to size and within selected village, a cluster of seven children is selected with somewhat centrist bias. Although the sampling design suggested by WHO is self-weighting, the centrist bias involved in the selection of the children, distorts this property and hence there is an influence of both the factors viz. higher preponderance of the large size villages in the sample and the centrist bias in the selection of cluster which together results in an upward bias in the results.

3 In low density districts like Jaislamer, where system of Dhanis (hamlets) is prevalent, IRMS methodology needs suitable modifications. Since Dhanis are homogeneous, modification should be by selecting more villages (Dhanis) and taking less number of children/mothers per village as compared to what is suggested in IRMS methodology.

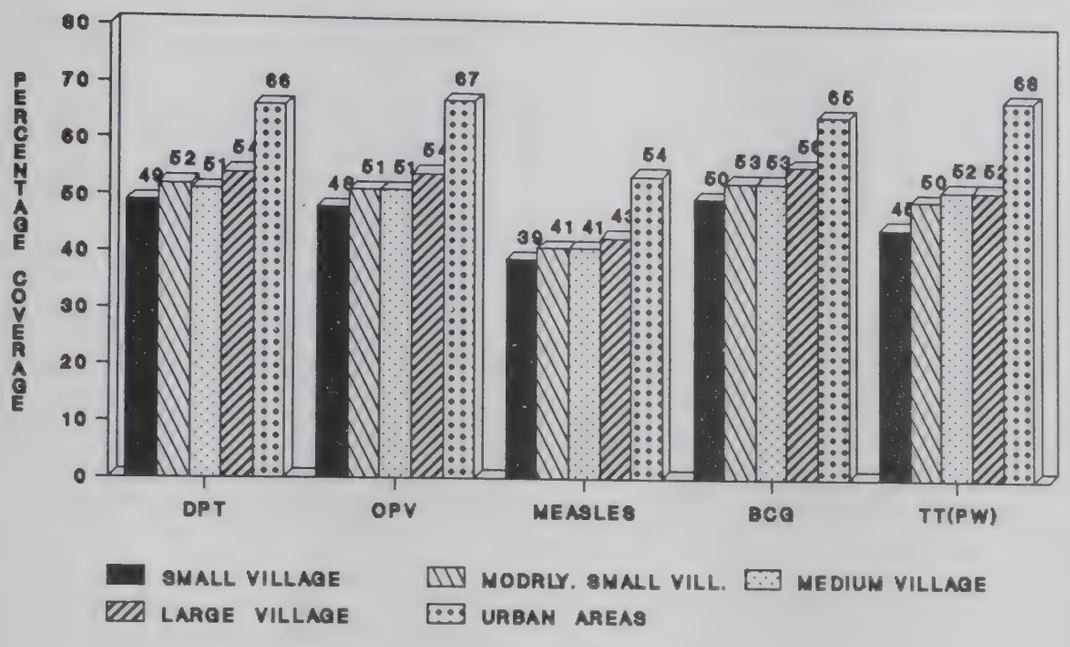
CHARTS

IMMUNISATION COVERAGE OF CHILDREN AND MOTHERS IN FOUR STATES



IMMUNISATION COVERAGE BY VILLAGE SIZE IN RURAL & URBAN AREAS

U.P.



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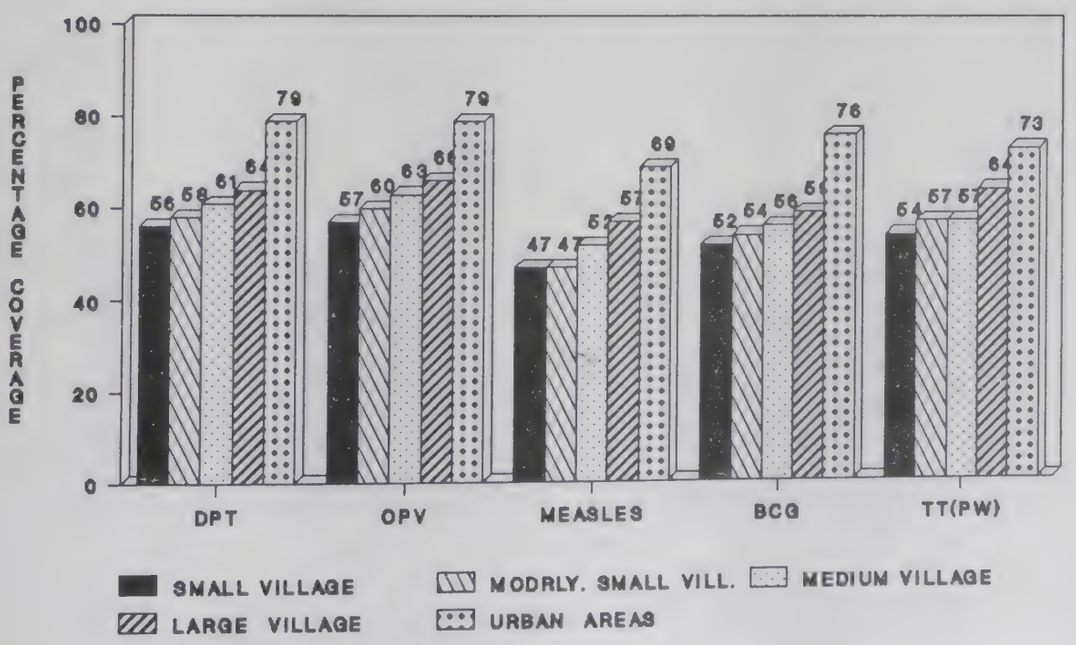
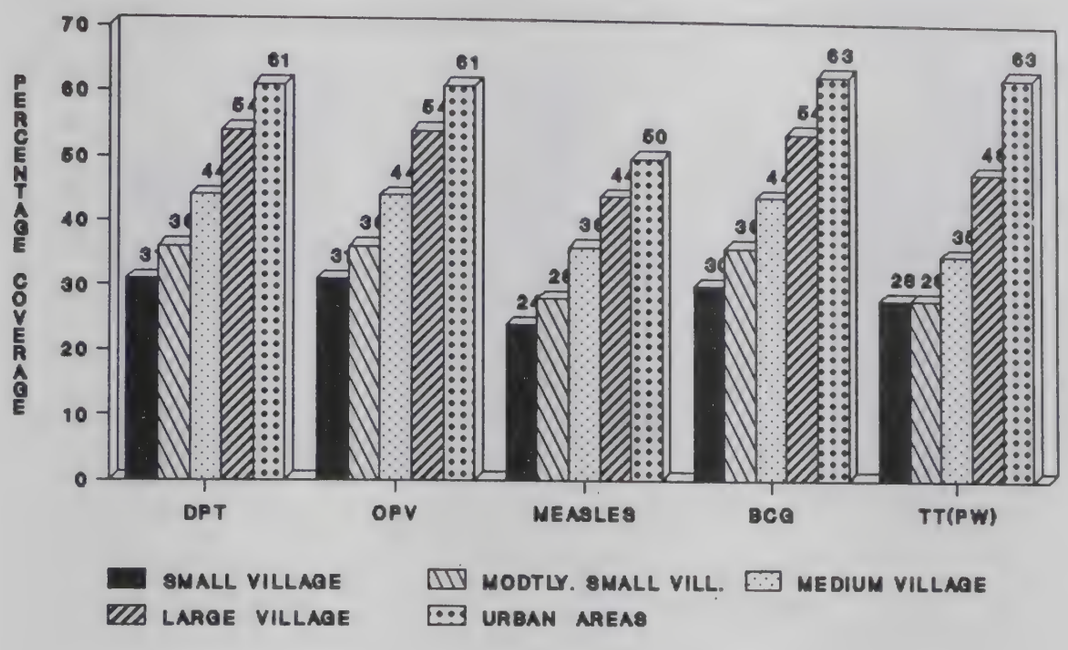


IMMUNISATION COVERAGE BY VILLAGE SIZE IN RURAL & URBAN AREAS

RAJASTHAN



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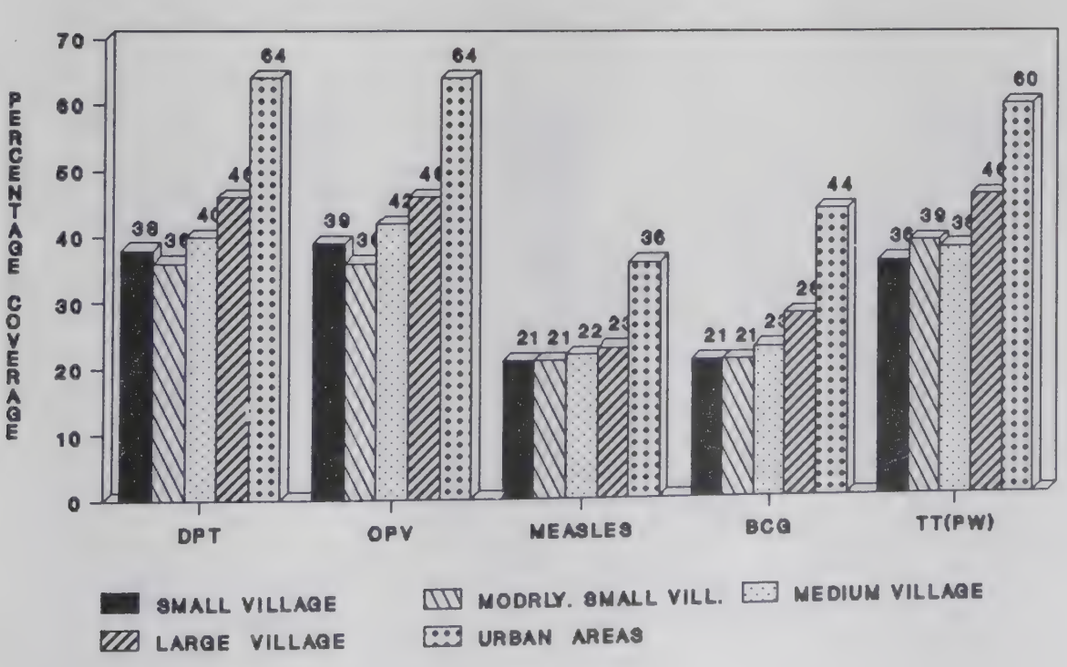

IMMUNISATION COVERAGE BY SEX IN RURAL & URBAN AREAS

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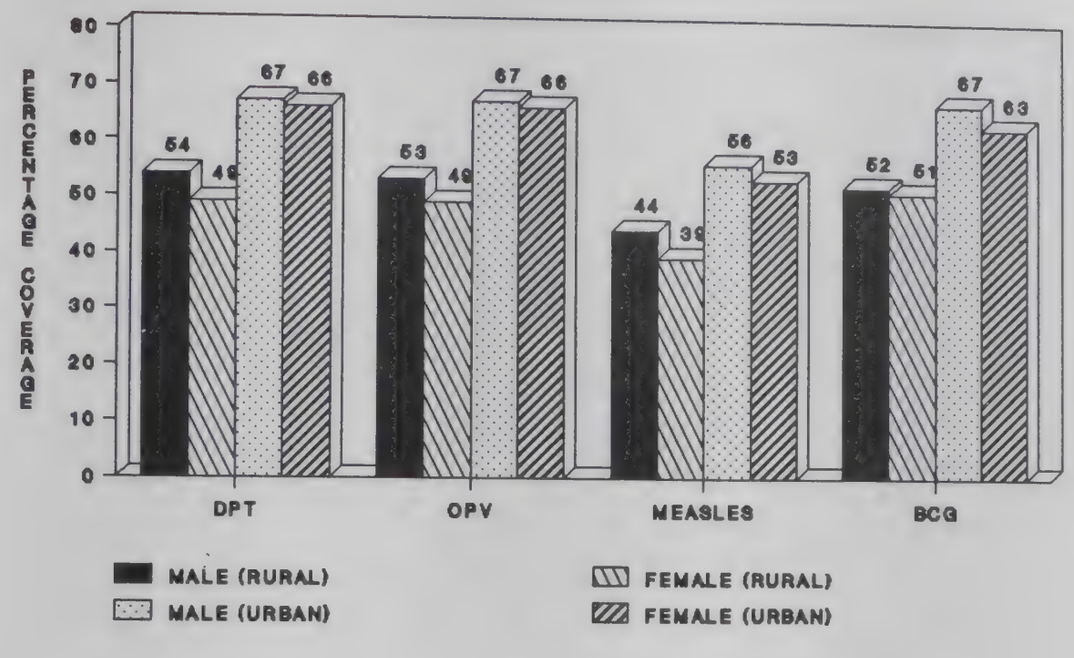

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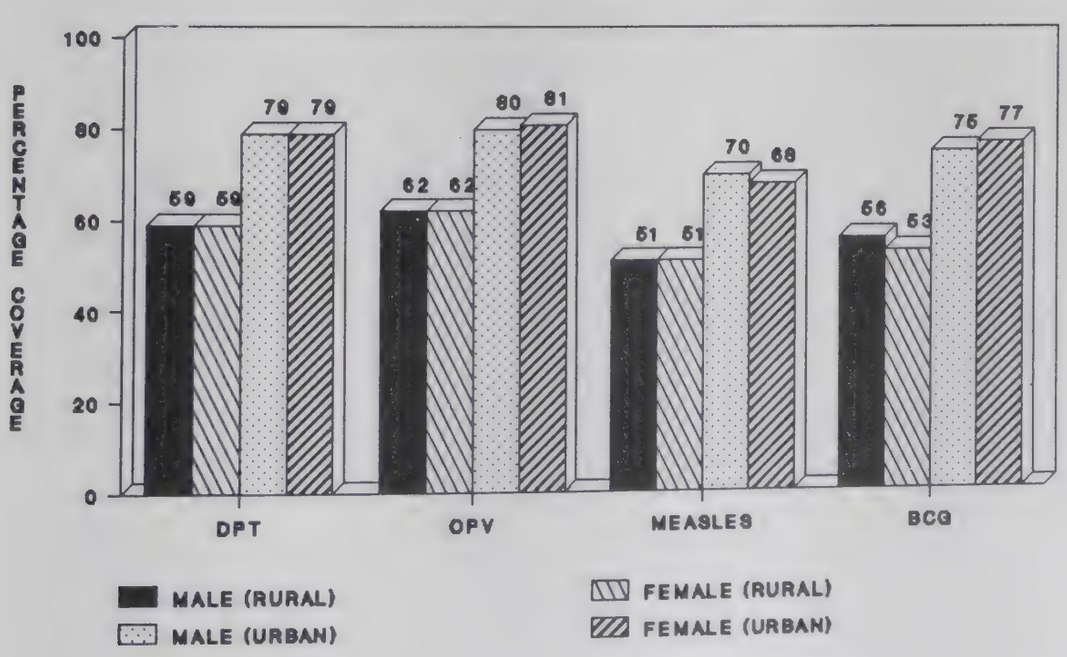

IMMUNISATION COVERAGE BY SEX IN RURAL & URBAN AREAS

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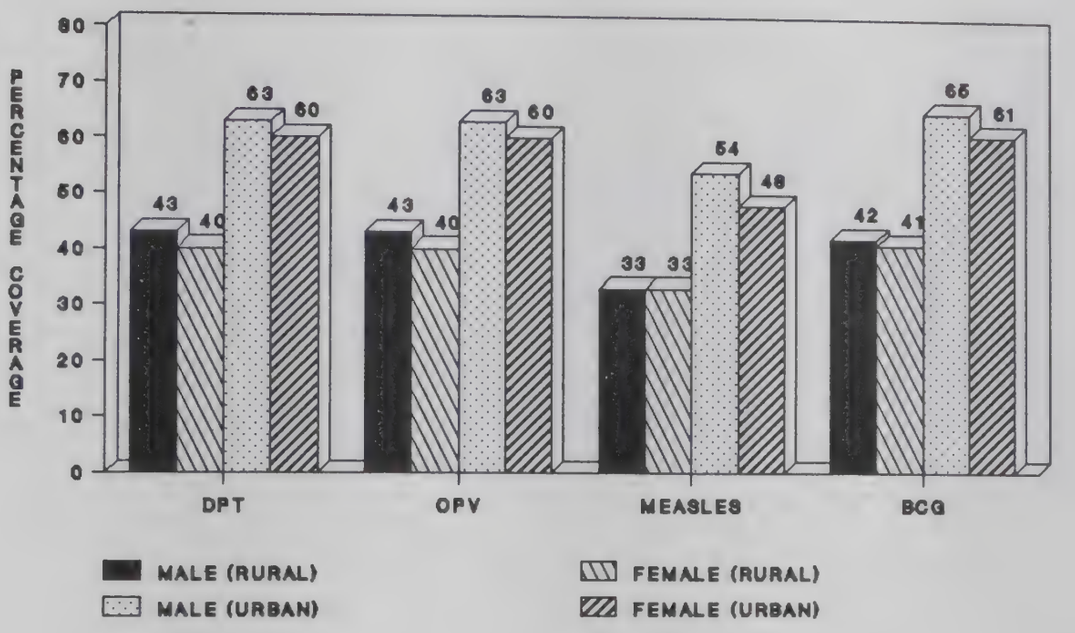

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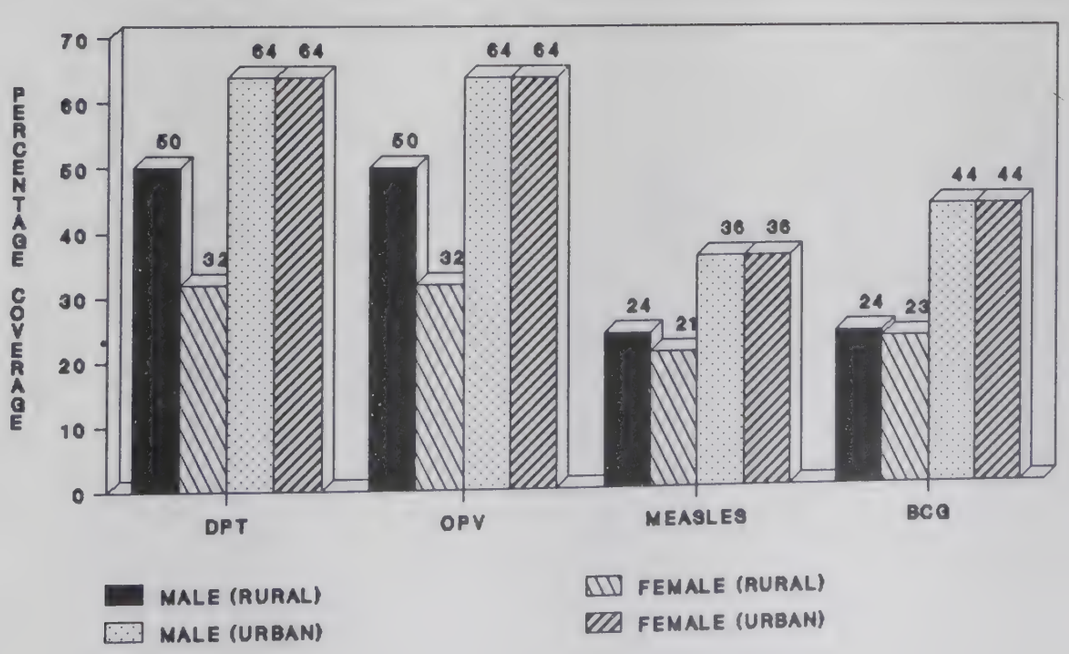

IMMUNISATION COVERAGE BY CASTE IN RURAL & URBAN AREAS

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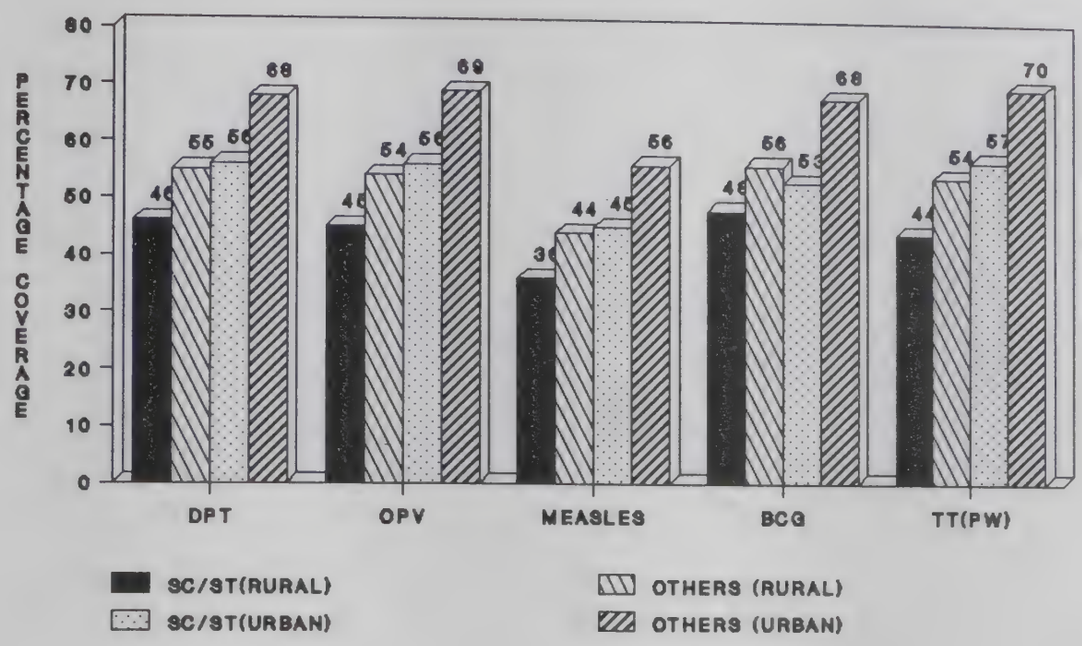

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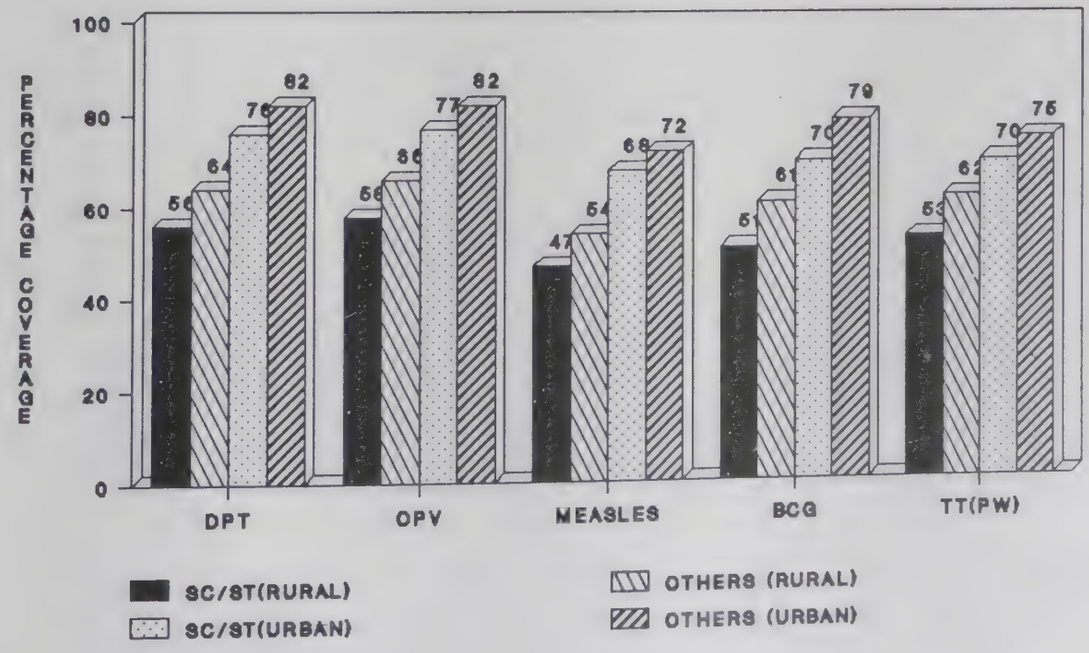

IMMUNISATION COVERAGE BY CASTE IN RURAL & URBAN AREAS

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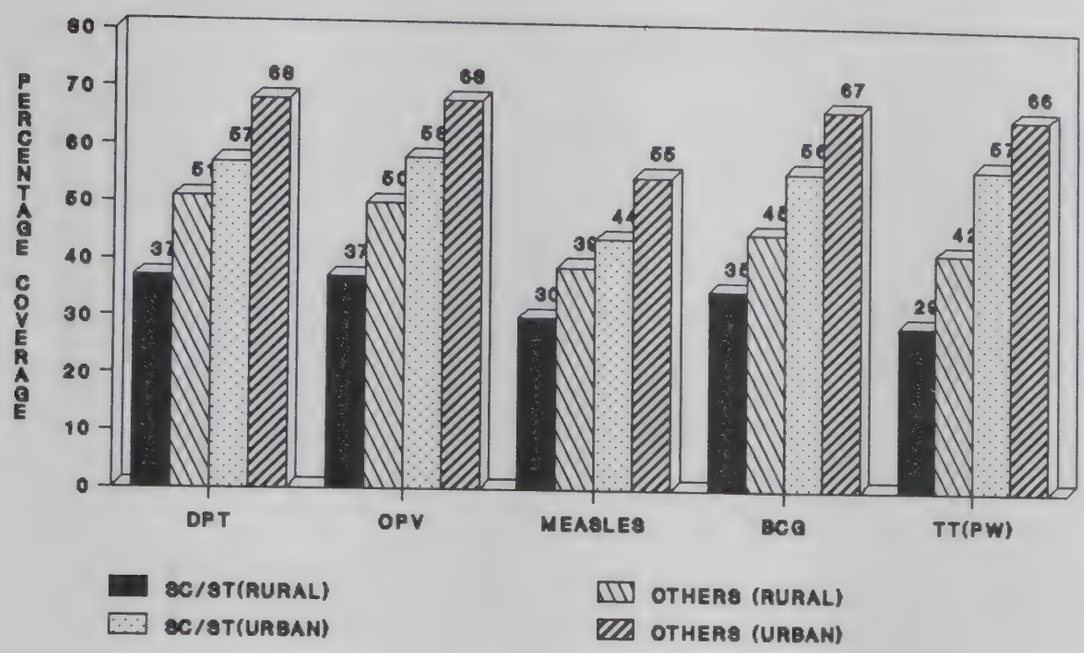

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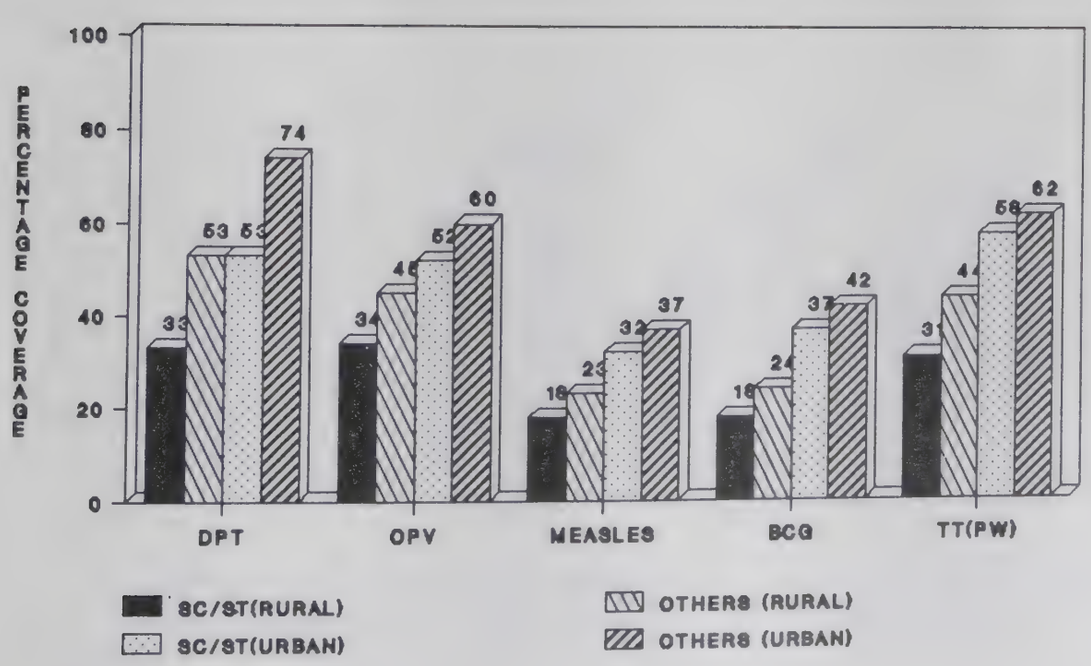

IMMUNISATION COVERAGE BY LITERACY OF FATHER IN RURAL & URBAN AREAS

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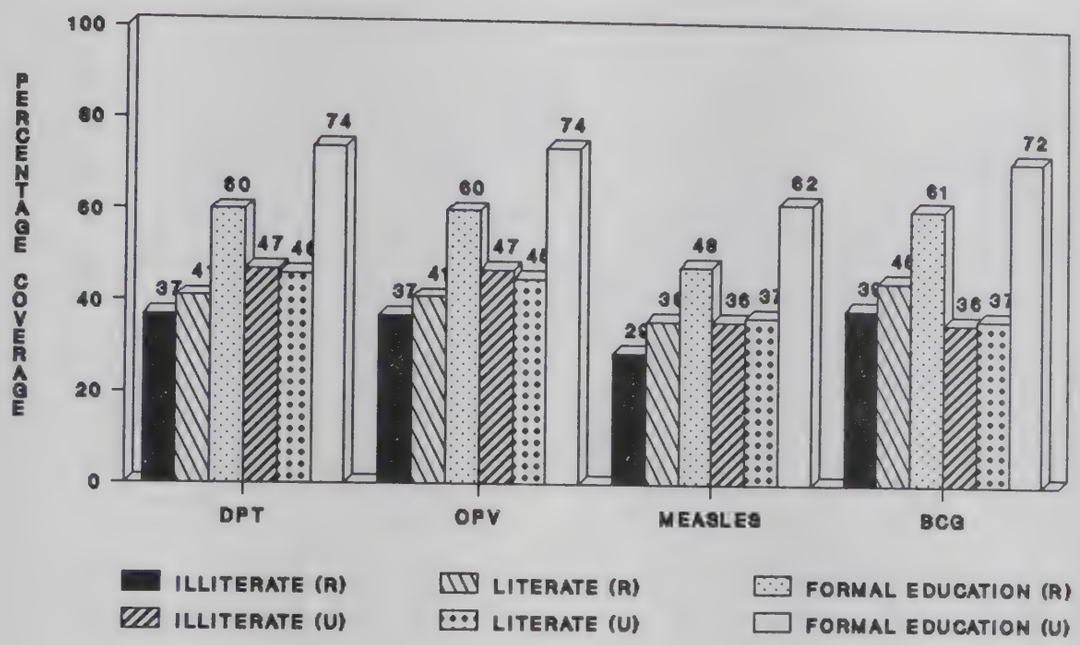

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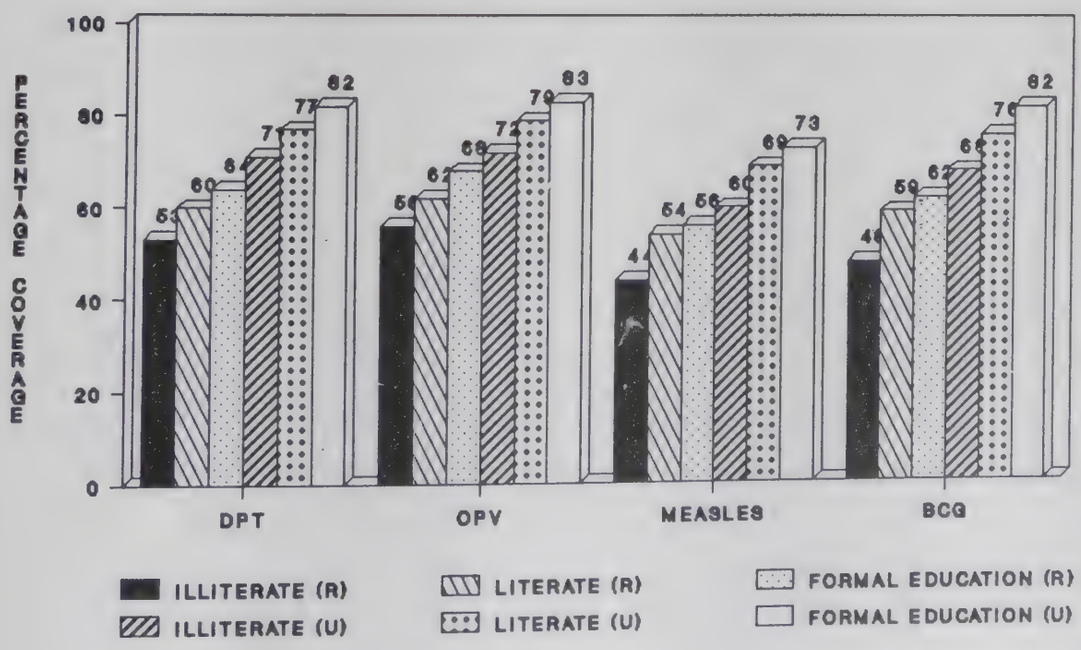

IMMUNISATION COVERAGE BY LITERACY OF FATHER IN RURAL & URBAN AREAS

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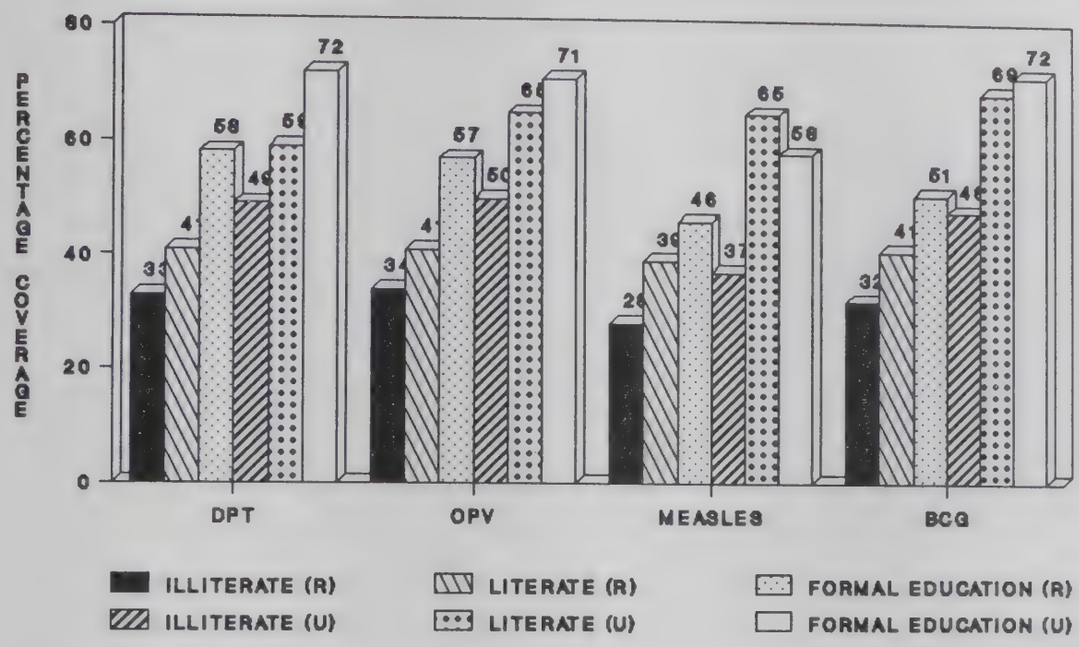

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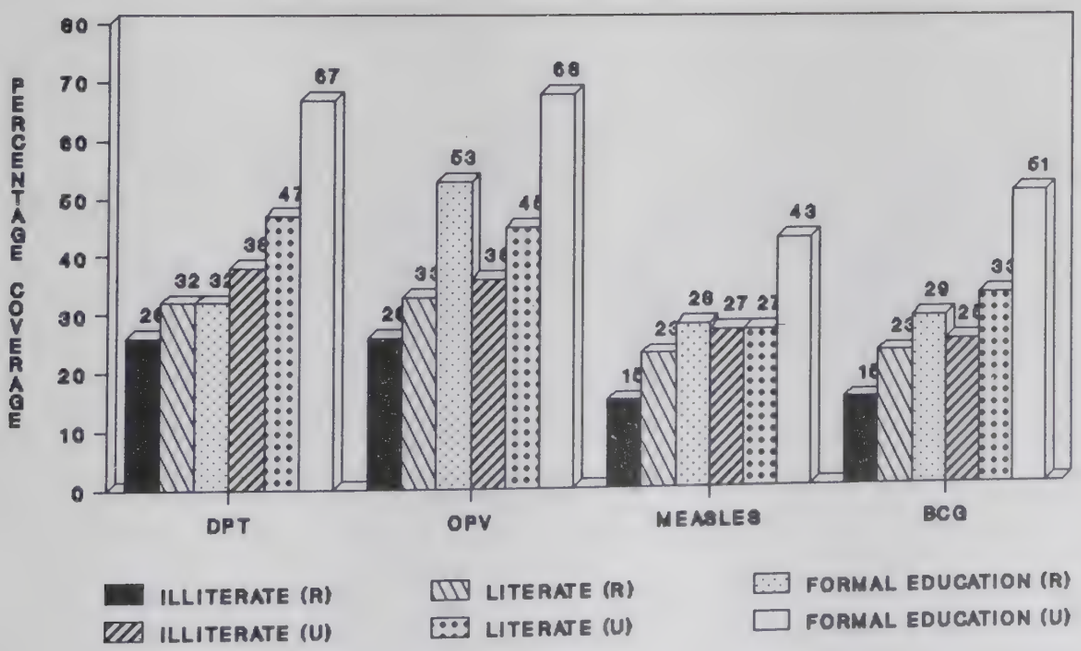

IMMUNISATION COVERAGE BY LITERACY OF MOTHER IN RURAL & URBAN AREAS

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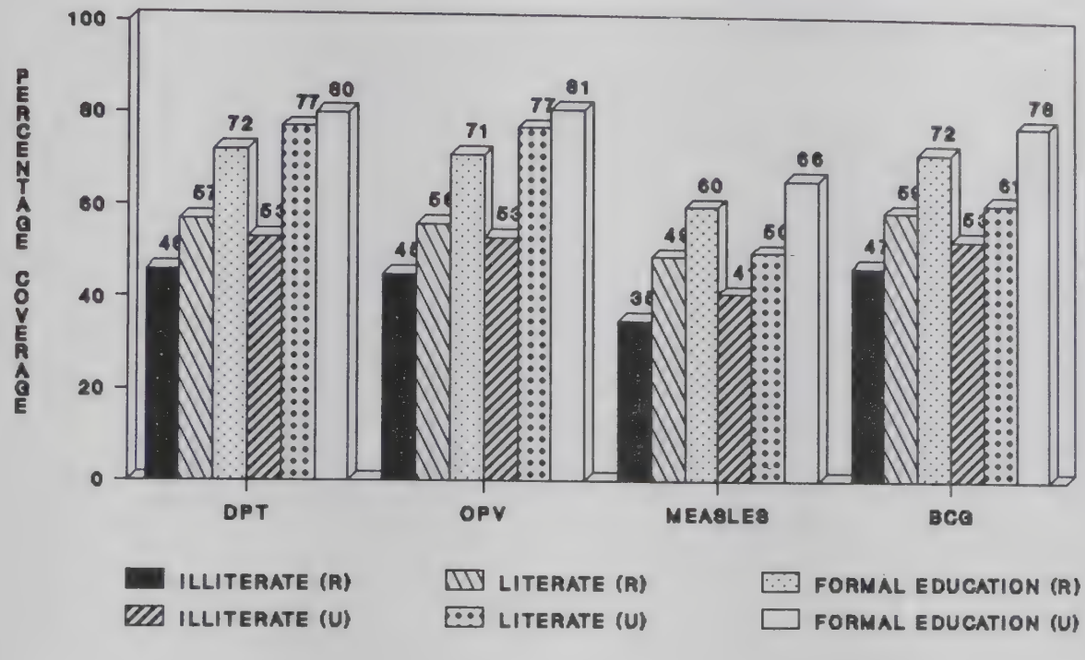

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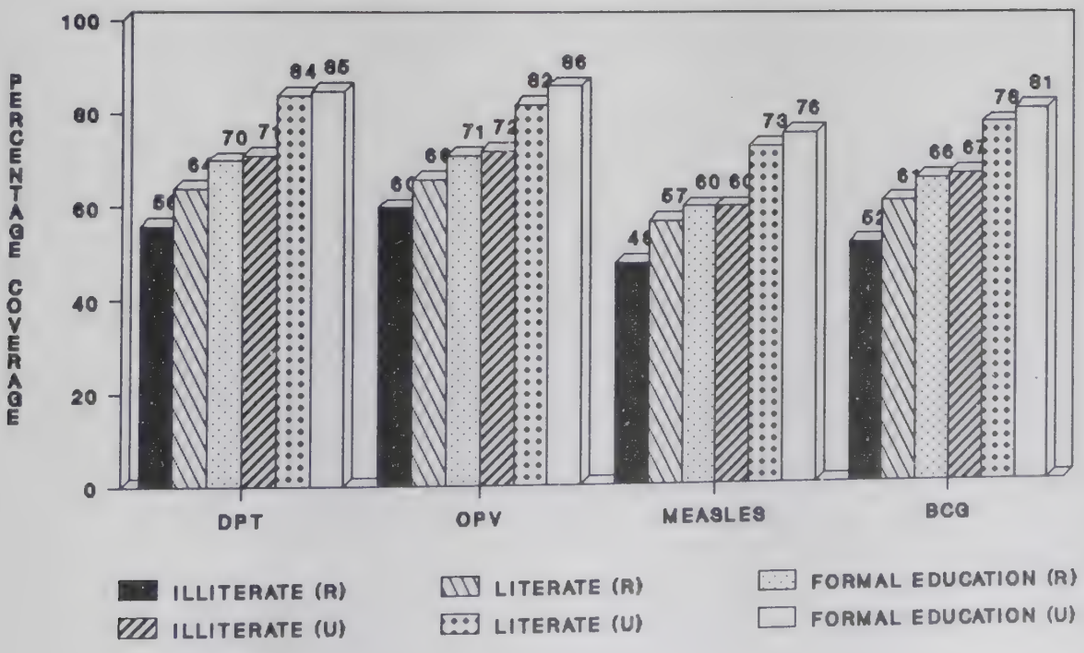

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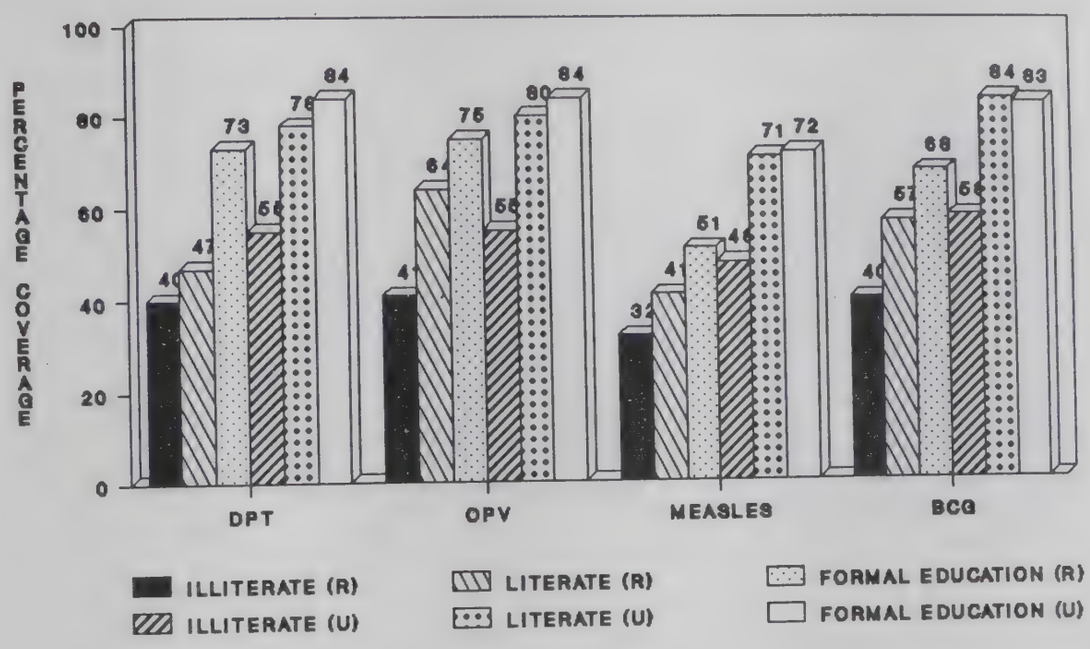

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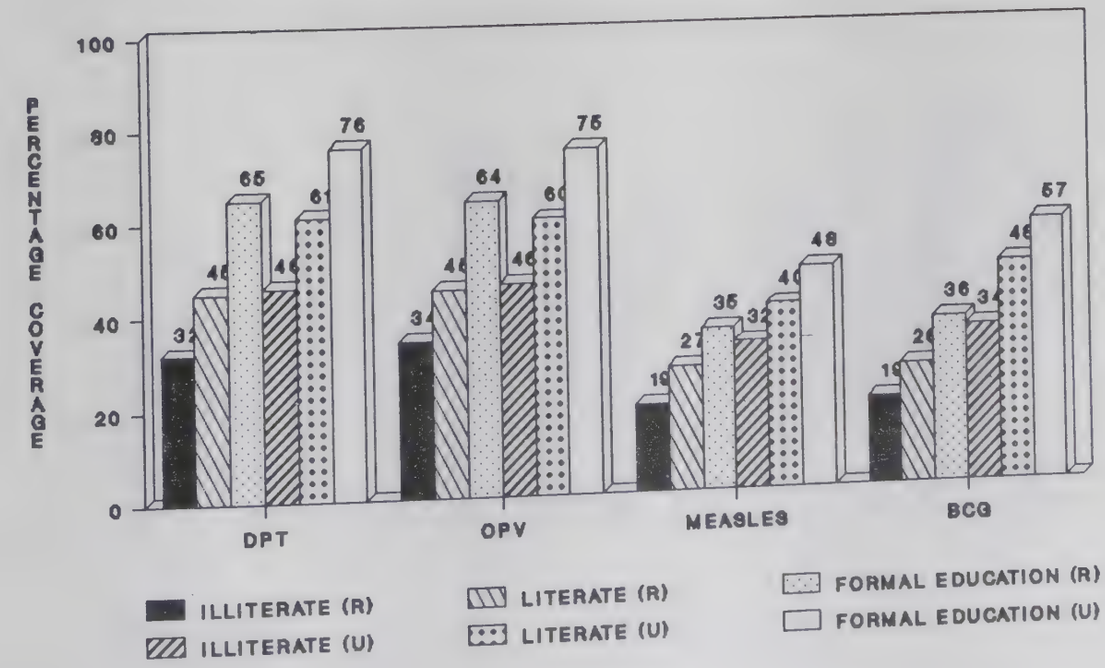
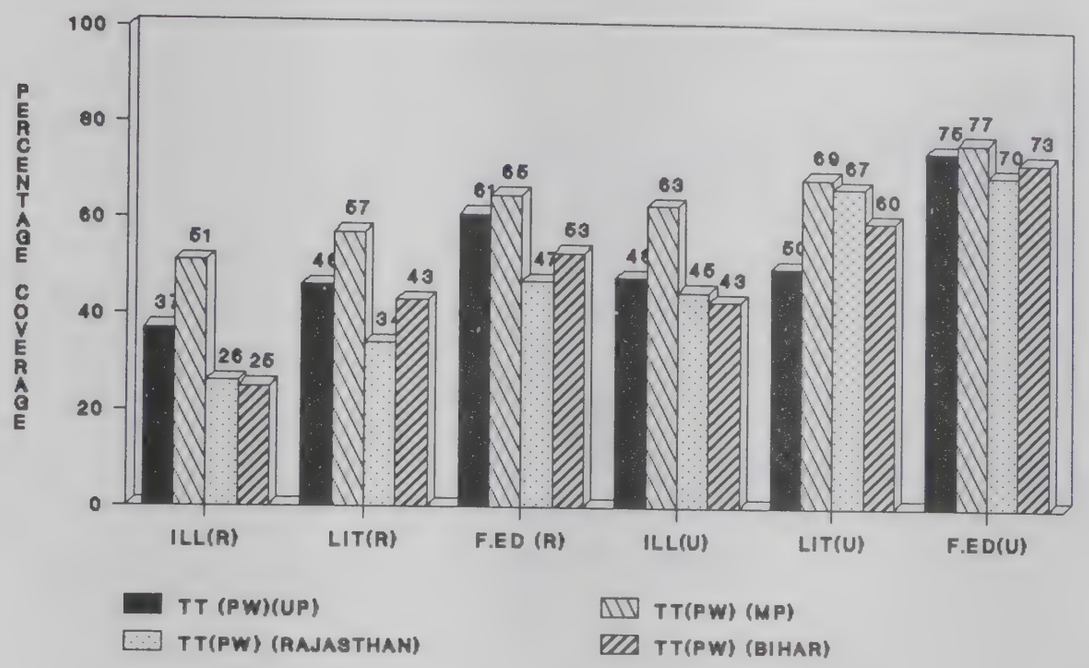
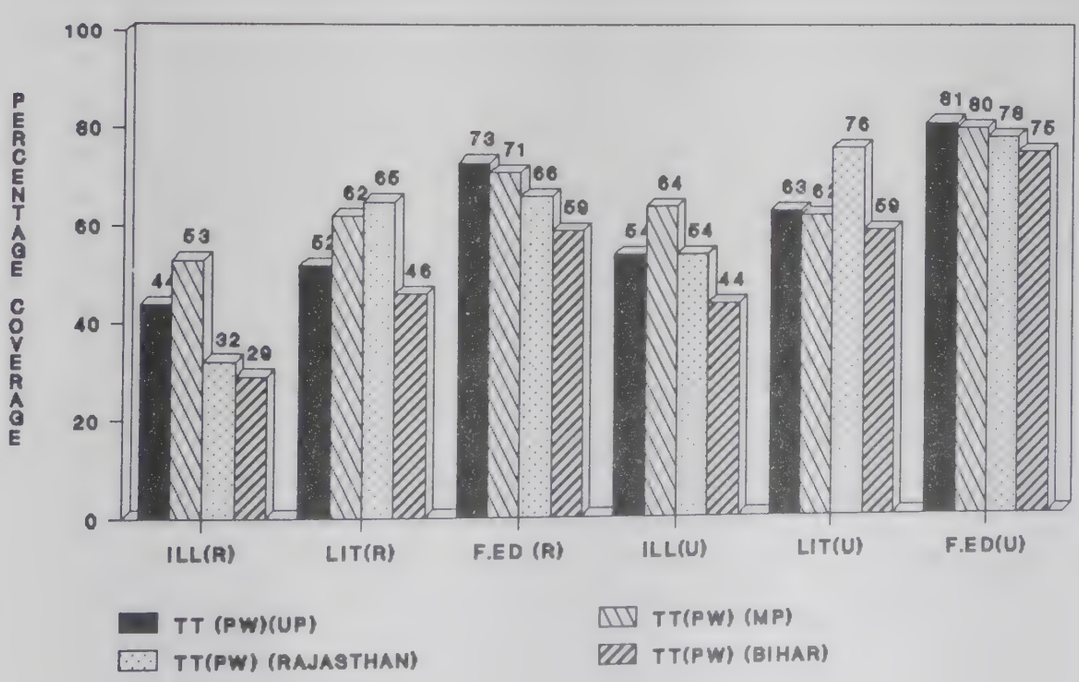


IMMUNISATION COVERAGE OF PREGNANT MOTHERS BY HUSBANDS' LITERACY IN FOUR STATES



IMMUNISATION COVERAGE OF PREGNANT MOTHERS BY LITERACY OF SELF IN FOUR STATES



FIELD AGENCIES

State	Name of the Agency
Uttar Pradesh	Centre for Research, Planning and Action, 16/10, Hailey Road, New Delhi
Madhya Pradesh	Techno Economic Research Institute J-7, Saket, New Delhi
Rajasthan	Indian Institute of Health Management Research, 1, Prabhu Dayal Marg, Sanganer Airport Jaipur
Bihar	Centre for Agricultural and Rural Development Studies, B-21, Naraina Vihar, New Delhi

METHODOLOGICAL INVESTIGATION ON SURVEYS OF IMMUNISATION COVERAGE
SPONSORED BY UNION MINISTRY OF HEALTH AND FAMILY WELFARE
INSTITUTE FOR RESEARCH IN MEDICAL STATISTICS
(Indian Council of Medical Research)

CHILD COVERAGE SCHEDULE

[1- 3] JOB# | I | M | | [4-5]CD # | 3 | 1 |

[6-12] State:---------- | | | District: ---------- | | | Stratum: | | Village/Town:--------- | | |
Bastis (SC/ST): Name Approximate population:
Others:_____

Range of Birth Dates:- From: | | | | | | | Till | | | | | |

[13-14]	Child No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Child Name.															
[15]	Sex (M/F)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Father's Name															
[16]	Caste/Religion $	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
[17]	Father's Educational Status $	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
[18]	Mother's Educational Status $	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Birth Date	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
[19-20]	Age Months (M)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
[21]	Imm. Card I/O															
[22-23]	DPT 1 Age (M)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
[24]	Source*															
[25-26]	DPT 2 Age (M)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
[27]	Source*															
[28-29]	DPT 3 Age (M)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
[30]	Source*															
[31-32]	If No, Reason $															

	Child No.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
[33-34] [35]	Polio 1	Age (M) Source*	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
[36-37] [38]	Polio 2	Age (M) Source*	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
[39-40] [41]	Polio 3	Age (M) Source*	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
[42-43]	If No, Reason $																
[44-45] [46]	Measles	Age (M) Source*	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
[47-48]	If No, Reason																
[49-50] [51]	B.C.G.	Age (M) Source $	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
[52-53]	If No, Reason																
[54]	Scar l/O																
[55] [56-57]	** Mother Imm. If No,Reason $		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

$ Write appropriate codes given in the instructional manual.

* Source: Hospital - HOS - 1., Health Centre -HEC - 2., Outreach (Govt.) -OGT - 3., Outreach (Pvt.) -OPT - 4., Non Govt./Pvt. -PRV - 5.

** Fully: 1, Partly: 2, No.3.

Investigator Name:_____ Signature:_____ Date:_____

Checked by (Name):_____ Signature:_____ Date:_____

Remarks (if any): .....

METHODOLOGICAL INVESTIGATION ON SURVEYS OF IMMUNISATION COVERAGE
SPONSORED BY UNION MINISTRY OF HEALTH AND FAMILY WELFARE
INSTITUTE FOR RESEARCH IN MEDICAL STATISTICS
(Indian Council of Medical Research)

MOTHER COVERAGE SCHEDULE

[1- 3] JOB# | I | M | 1 | [4-5] CD# | 4 | 1 |

[6-12] State:---------- | | | District: ---------- | | | Stratum: ..... | | Village/Town:---------- | | |

Range of Birth Dates : From : | | | | | | | | Till : | | | | | | |

Bastis (SC/ST): Name Approximate population:
Others: _____

[13-14]	Mother No.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Mother's Name																
	Her Husband's name																
[15]	Caste/Religion $		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
[16]	Her Educational Status $		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
[17]	Her Husband's Educational status $		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Birth date of child		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
[18-19]	Age of the child in Months (M)		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
[20]	Immunisation card 1/0																
[21-22]	TT1	Pregnancy duration (M)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
[23]		Source*															
[24-25]	TT2	Pregnancy duration (M)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
[26]		Source*															
[27-28]	If no, Reason $																

	Mother Number		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
[29-30]	Booster	Pregnancy duration (M)															
[31]		Source*															
[32-33]	If no. Reason*																
[34-35]	Antenatal	Number of visits															
[36-37]	Care	Number of Fe. & Folic Acid Tab. Given															
[38-39]	If no. Reason $																
[40]	Place of delivery**																
[41]	Delivery attended by @																
[42]	Child imm. Schedule followed 1/0																

$ Write appropriate codes given in the instruction manual.

* Source codes : Hospital - HOS - 1., Health Centre - HEC - 2., Outreach (Govt.) -OGT - 3., Outreach (Pvt.) -OPT - 4., Non Govt./Pvt. -PRV - 5.

** Place of delivery codes : Home - 1, Hospital - 2, Other (Specify) - 3.

@ Attended by codes : Untrained Dai - 1, Traind Dai - 2, Health Staff - 3.Other (Specify)- 4.

Investigator Name: ..... Signature: ..... Date: .....

Checked by (Name): ..... Signature: ..... Date: .....

Remarks: .....

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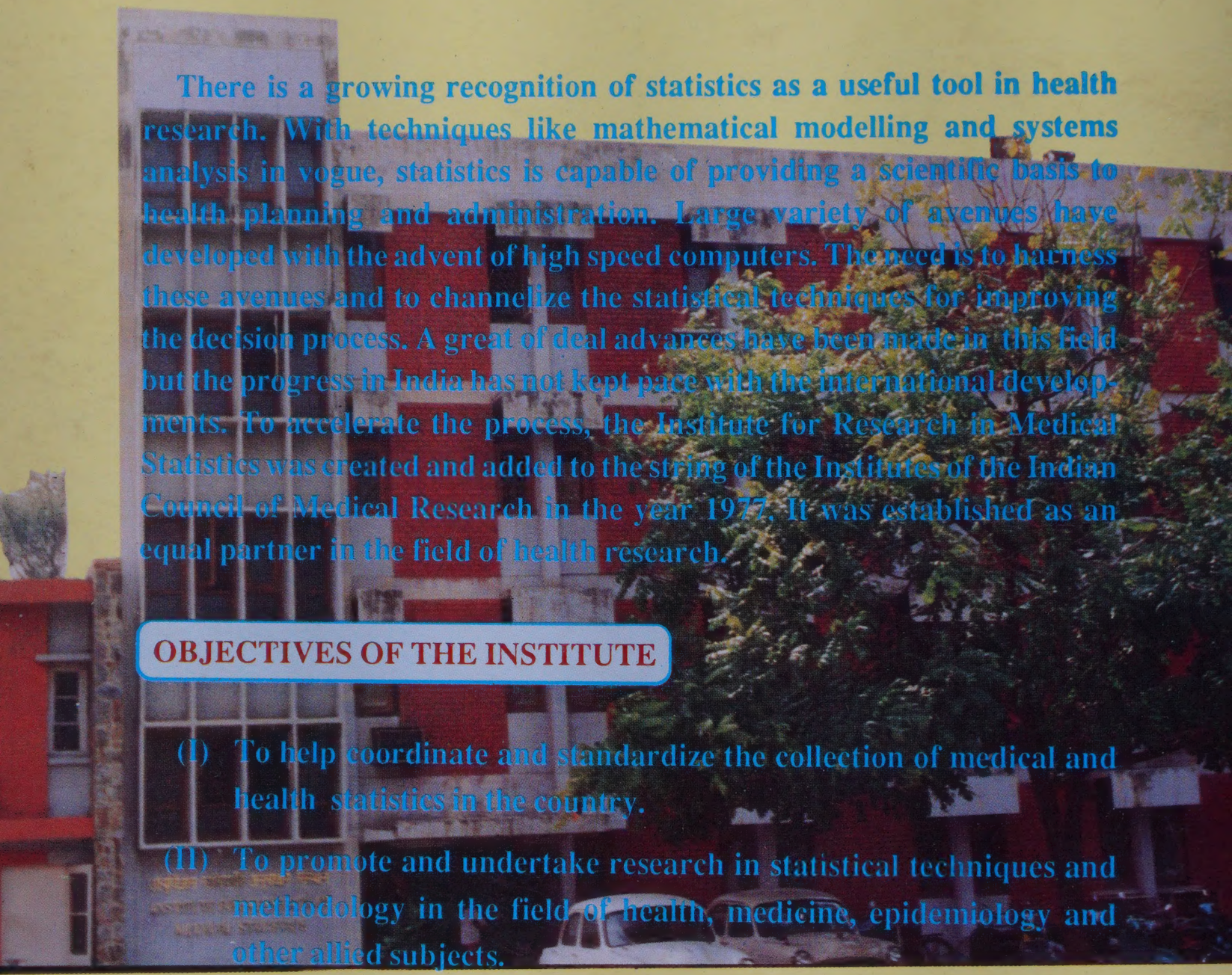
INSTITUTE FOR RESEARCH IN MEDICAL STATISTICS



There is a growing recognition of statistics as a useful tool in health research. With techniques like mathematical modelling and systems analysis in vogue, statistics is capable of providing a scientific basis to health planning and administration. Large variety of avenues have developed with the advent of high speed computers. The need is to harness these avenues and to channelize the statistical techniques for improving the decision process. A great of deal advances have been made in this field but the progress in India has not kept pace with the international developments. To accelerate the process, the Institute for Research in Medical Statistics was created and added to the string of the Institutes of the Indian Council of Medical Research in the year 1977. It was established as an equal partner in the field of health research.

OBJECTIVES OF THE INSTITUTE

(I) To help coordinate and standardize the collection of medical and health statistics in the country.

(II) To promote and undertake research in statistical techniques and methodology in the field of health, medicine, epidemiology and other allied subjects.

(III) To provide statistical service and assistance to Centre,State and local bodies in handling problems in health and medicine.

(IV) To exercise surveillance to ensure the statistical adequacy and validity in the Council's programme.

(V) To conduct training in applied statistics for both statisticians, medical and paramedical personnel.